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MX SITING INVESTIGATION. GEOTECHNICAL EVALUATION OF LUKE BOMBIN--ETC(U)

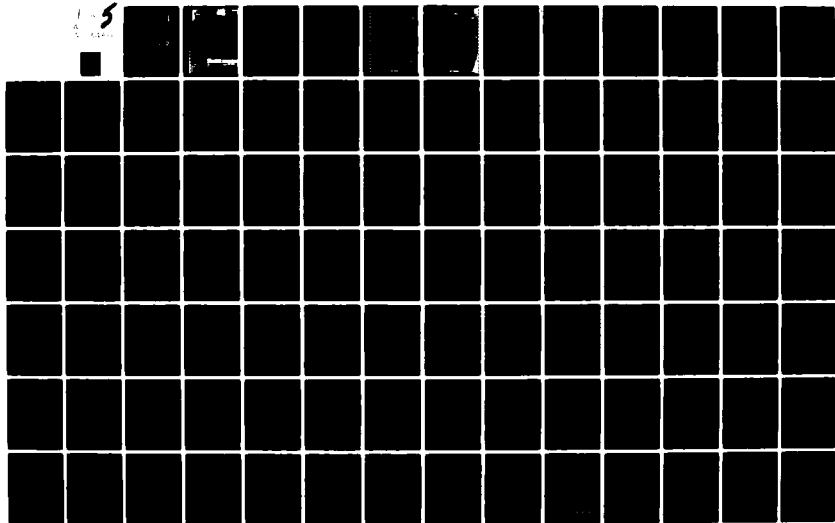
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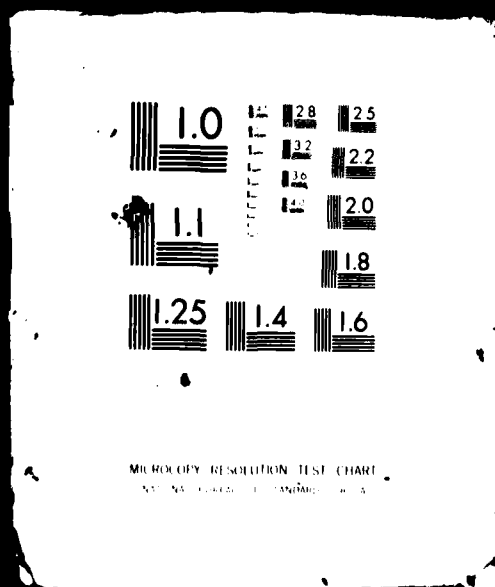
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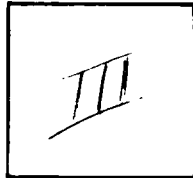
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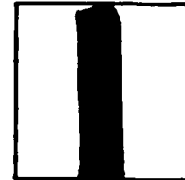
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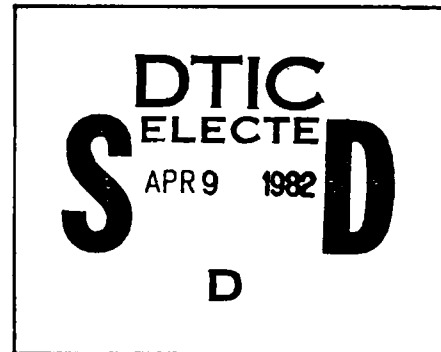
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MX SITING INVESTIGATION
GEOTECHNICAL EVALUATION OF
LUKE BOMBING AND GUNNERY RANGE
GEOTECHNICAL REPORT
LECHUGUILLA DESERT, ARIZONA
VOLUME IV
APPENDICES C AND D SUPPLEMENT

AD A113450

MX SITING INVESTIGATION
GEOTECHNICAL EVALUATION OF
LUKE BOMBING AND GUNNERY RANGE
GEOTECHNICAL REPORT
LECHUGUILLA DESERT, ARIZONA
VOLUME IV
APPENDICES C AND D SUPPLEMENT

Prepared for:

Space and Missile Systems Organization (SAMSO)
Norton Air Force Base, California

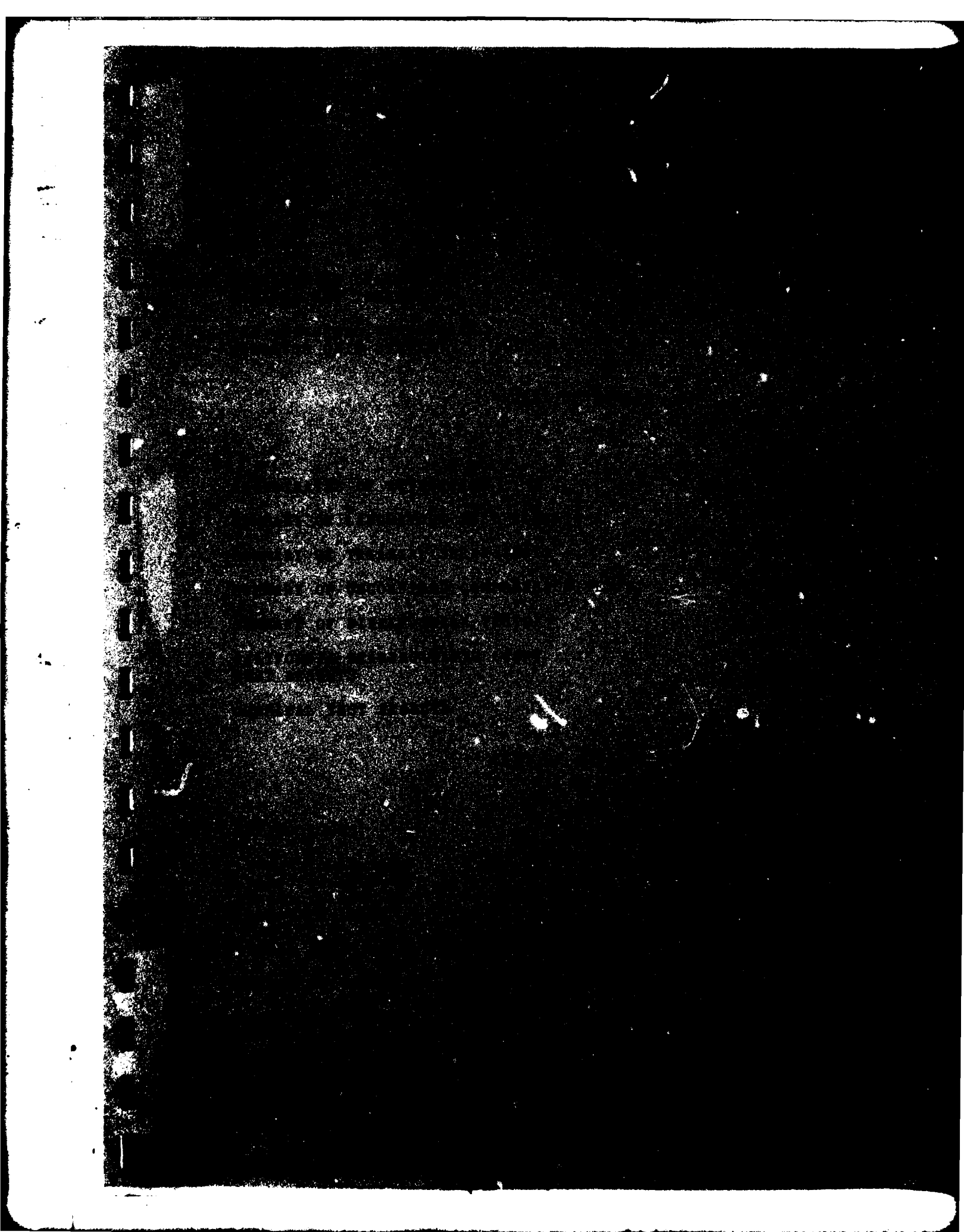
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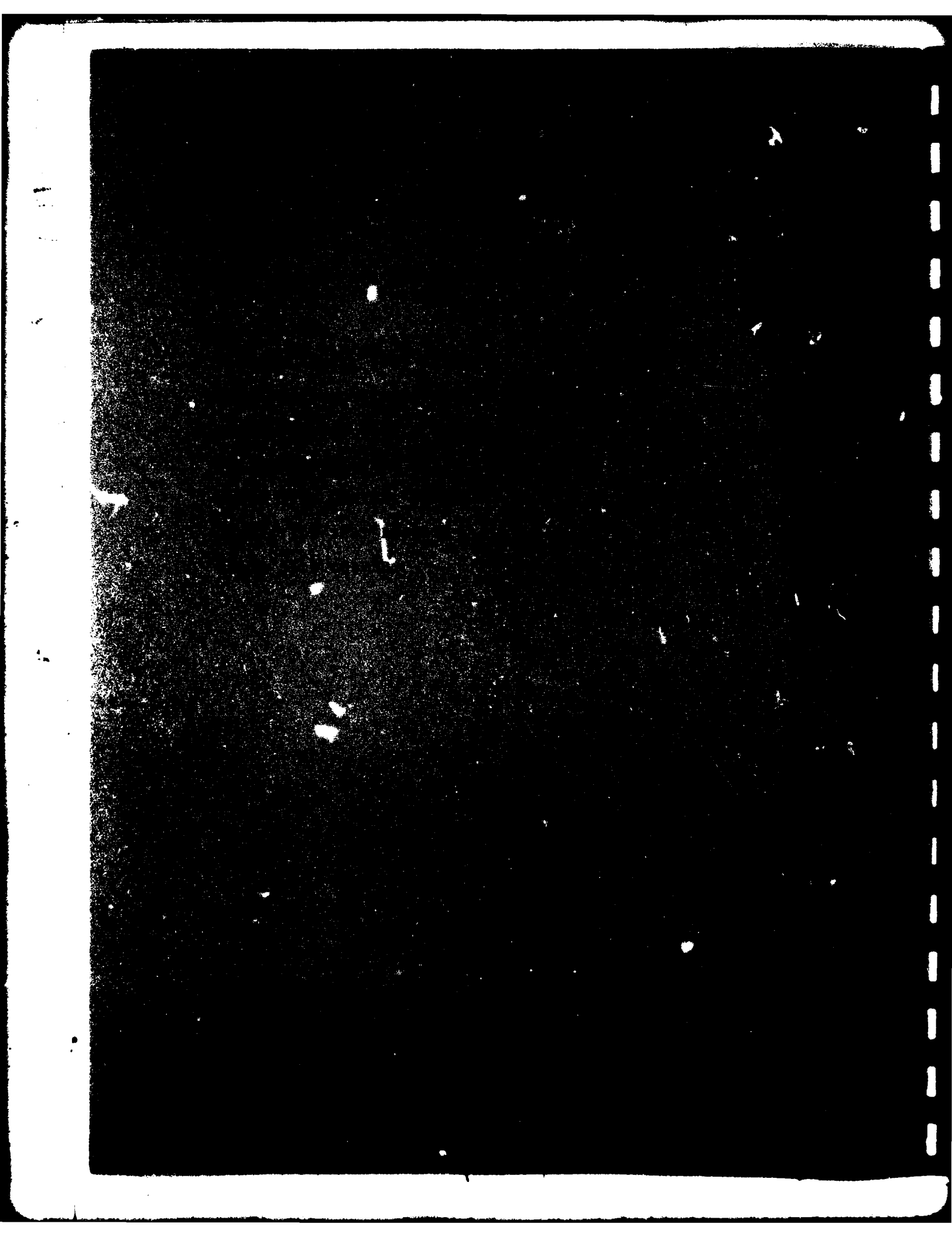
Fugro National, Inc.
3777 Long Beach Boulevard
Long Beach, California 90807

20 January 1978

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER FN-TR-19D-IV	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) MX Siting Investigation Geotechnical evaluation of Luke Bombing + Gunnery Range, Geotechnical Report Lechuguilla Desert, Arizona Volume IV C&D Supplement		5. TYPE OF REPORT & PERIOD COVERED Final
7. AUTHOR(s) Fugro National, Inc.		6. PERFORMING ORG. REPORT NUMBER FN-TR-19D IV
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Summary of Lab test results, triaxial shear tests, unconfined compression tests, direct shear tests, Chemical test results, geology, geologic log, grain size, soil California bearing test		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) M-X Siting Investigation Report, Geotechnical Evaluation of Luke AFB Bombing and Gunnery Range, Lechuguilla Desert, Arizona. Report includes Summary of Laboratory test Results for Triaxial shear test, Unconfined Compression tests, Direct shear test, Chemical test Results, and Boring Logs.		





APPENDIX C ENGINEERING DATA

C.1 EXPLANATION OF LOGS OF BORINGS AND TRENCHES

C.1.1 BORING AND TRENCH DESIGNATIONS

Boring and trench designations begin with the initials of the study area: LD-Lechuguilla Desert. This is followed by a letter which is an indication of the activity and nominal depth:

- A - Boring, 50 feet (15.2 m)
- B - Boring, 100 feet (30.5 m)
- C - Boring, 300 feet (91.4 m)
- D - Boring, 1000 feet (304.8 m)
- T - Trench, 20 feet (6.1 m)

It is concluded with the number of the boring or the trench (Example: LD-A-1).

C.1.2 SAMPLE TYPE

Different sampling techniques were used and the symbols are explained in the lower left corner of the log. Sample intervals shown on the A and B boring logs indicate, to scale, the interval of sample recovery. Due to the constraints of boring log scale, sample intervals on the C and D logs are not shown to scale.

C.1.3 PERCENT RECOVERY

The ratio (in percent) of the soil sample recovered in the sampler to the full penetration of the sampler.

C.1.4 N Value

Penetration resistance, number of blows required to drive the standard split spoon sampler for the second and third 6 inches (0.15 m) with a 140 pound (63.5 kg) hammer falling 30 inches (0.76 m) (ASTM D 1586-67).

C.1.5 R

N value greater than 100 blows/foot (100 blows/0.3 m).

C.1.6 USCS

Unified Soil Classification System (Figure C-__).

C.1.7 SIEVE ANALYSES

GR - gravel, rock particles that will pass a 3-inch (76 mm) Sieve and are retained on the No. 4 (4.75 mm) sieve size.

SA - Sand, soil particles passing the No. 4 (4.75 mm) sieve size and retained on the No. 200 (0.075 mm) sieve size.

FI - Fines, silt or clay, soil particles passing the No. 200 (0.075 mm) sieve size.

LL - Liquid limit, the water content corresponding to the arbitrary limit between the liquid and plastic states of consistency of a soil (ASTM D423-66).

PL - Plastic limit, the water content corresponding to an arbitrary limit between the plastic and the semisolid states of consistency of a soil (ASTM D424-59).

PI - Plasticity index, numerical difference between the liquid limit and the plastic limit.

NP - In the plasticity index (PI) column, indicates that a test was performed and the material was found to be non-plastic.

C.1.8 ELEVATIONS

Indicated elevations on the logs were estimated from topographic maps of the study area, within an accuracy of half the contour interval.

C.1.9 TRENCH LOGS

The following conventional symbols were used:

- _____ a well defined contact between units
- - - - - contact between units, approximately located
(within 3 inches; 76 mm)
- ////////// gradational contact (limits indicated by hatched
regions)

C.1.10 SOIL DESCRIPTION

In the soil descriptions, the following terms are used to indicate approximate amounts of secondary materials (percentage by weight): Trace - 0 to 12 percent; little - 13 to 20 percent; some - 21 to 35 percent.

C.1.11 CONSISTENCY

Consistency descriptions of coarse grained soils (GW, GP, GM, GC, SW, SP, SM, SC) are as follows:

<u>Consistency</u>	<u>N Value (ASTM D1586-67)</u>
Very loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

Consistency descriptions of fine grained soils (ML, CL, OL, MH, OH, PT) are presented below:

Consistency	Shear Strength		Field Guide
	(ksf)	(kN/m ²)	
Very Soft	0.25	12	Sample with height equal to twice the diameter, sags under own weight
Soft	0.25-	12-	Can be squeezed between thumb and forefinger
	0.50	24	
Firm	0.50-	24-	Can be molded easily with fingers
	1.00	48	
Stiff	1.00-	48-	Can be imprinted with slight pressure from fingers
	2.00	96	
Very Stiff	2.00-	96-	Can be imprinted with considerable pressure from fingers
	4.00	192	
Hard	Over 4.00	Over 192	Cannot be imprinted by fingers

C.2 THE UNIVERSAL TRANSVERSE MERCATOR GRID (UTM) SYSTEM

The UTM grid is designed for world use between 80° south latitude and 84° north latitude. Between those latitudes the world is divided into areas 6° east-west by 8° north-south, known as the Grid Zone Designation (GZD). The columns (6° wide) are identified by the UTM grid zone numbers (1 through 60) and the rows (8° high) are identified by letters. Starting at 80° south and proceeding northerly to 84° north, the rows are lettered using the letters C through X with the letters I and O omitted.

Each 6° by 8° area is divided into 100,000 meter squares based upon the UTM Grid for the area, and is known as the 100,000 meter square identification. Each column (north-south squares) is identified by a letter and each row (east-west squares) is identified by a letter. Starting at the 180° meridian and proceeding east along the equator the 100,000 meter columns are lettered A through Z omitting the letters I and O. The 100,000 meter rows are lettered A through V (I and O omitted) from south to north. Following the 100,000 meter square identification are the grid coordinates.

Example: Location of Boring LD-A-1

11S	Locates within 6° x 8° area
11SQG	Locates within 100,000 meter square
11SQG75	Locates within 10,000 meter square
11SQG7595	Locates within 1,000 meter square
11SQG759513	Locates within 100 meter square
11SQG75951380	Locates within 10 meter square

FN-TR-19D

The reader is referred to the "Department of the Army Field Manual FM-21-26" for further details.

C.2.1 BLM SUBDIVISION SYSTEM

An example of the BLM subdivision system is as follows:

Location of LD-A-1: LD/9-18-24 adb

ACTIVITY NO.	UTM	BLM SUBDIVISION SYSTEM
LD-C-1	11SQG77601033	LD/9-17-31 dab
LD-C-2	11SQG64160932	LD/9-19-35 cdd
LD-C-3	11SQG68080250	LD/10-18-29 cba
LD-C-4	11SQF74589050	
LD-C-5	12STL20519081	
LD-C-6	11SQG73180554	LD/10-18-14 cda
LD-D-1	11SQF71899597	
LD-D-2	11SQG75790365	LD/10-17-19 ccc
LD-D-3	11SQF70139285	
LD-T-1	11SQG76001370	LD/9-18-24 add
LD-T-2	11SQG77451026	LD/9-17-31 dba
LD-T-3	11SQG78750696	LD/10-17-8 ddd
LD-T-4	11SQG70761235	LD/9-18-28 abc
LD-T-5	11SQG73950800	LD/10-18-11 ada
LD-T-6	11SQF79939760	
LD-T-7	11SQF79839715	
LD-T-8	12STL20509095	
LD-T-9	12STL18609495	
LD-T-10	11SQG76650023	
LD-T-11	11SQF71209975	
LD-T-12	11SQF72109072	
LD-T-13	11SQF72109592	
LD-T-14	11SQF66609721	
LD-T-15	11SQG66270010	LD/10-18-31 ccc
LD-T-16	11SQG68570300	LD/10-18-29 abc
LD-T-17	11SQG68510505	LD/10-18-17 dcc
LD-T-18	11SQG64100350	
LD-T-19	11SQG65680980	LD/9-19-36 cac
LD-T-20	11SQG65650955	LD/9-19-36 cdb
LD-T-21	11SQG58810975	LD/9-19-32 cbb

COORDINATES OF ACTIVITIES
PAGE 1 OF 3
LECHUGUILLA DESERT, ARIZONA

WX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
C-1

FUGRO NATIONAL, INC.

ACTIVITY NO.	UTM	BLM SUBDIVISION SYSTEM
LD-A-1	11SQG75951380	LD/9-18-24 adb
LD-A-2	12STL18499495	
LD-A-3	11SQF81699068	
LD-A-4	11SQF76609544	
LD-A-5	11SQG73301067	LD/10-18-35 bad
LD-A-6	11SQF72139094	
LD-A-7	11SQG64140048	
LD-A-8	11SQG67450720	LD/10-18-7 dad
LD-A-9	11SQG61840680	
LD-A-10	11SQG68080250	LD/10-18-29 bcd
LD-A-11	11SQG79661383	LD/9-17-21 bcd
LD-A-12	11SQG73980816	LD/10-18-11 aad
LD-B-1	11SQF80049705	
LD-B-2	11SQG70851220	LD/9-18-28 abd
LD-B-3	11SQG78630692	LD/10-17-17 aaa
LD-B-4	11SQG76890241	LD/10-17-30 dca
LD-B-5	11SQG79941242	LD/9-17-28 bdb
LD-B-6	11SQF78199354	
LD-B-7	11SQG76810005	
LD-B-8	11SQG76810005	
LD-B-9	11SQG76810005	
LD-B-10	11SQG69460134	LD/10-18-33 bcb
LD-B-11	11SQF66659640	
LD-B-12	11SQG64400467	
LD-B-13	11SQG59810785	
LD-B-14	11SQG60701222	LD/9-19-28 bab
LD-B-15	11SQG60701222	LD/9-19-28 bab
LD-B-16	11SQG70870844	LD/10-18-3 ccc
LD-B-17	11SQG69531236	LD/9-18-29 aac
LD-B-18	11SQG75230010	

COORDINATES OF ACTIVITIES
PAGE 2 OF 3
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
C-1

FUGRO NATIONAL, INC.

FUGRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT								
				STANDARD SIEVE OPENING						U S STAM		
				BLDRS	COBBLES		GRAVEL			SAI		
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10
LD-A-1	B-1	0.5-1.0	0.15-0.30						100	99	96	86
	S-2	5.8-7.3	1.77-2.22							100	99	93
	B-3	13.0-13.5	3.96-4.11									
	S-4	15.0-16.5	4.57-5.03									
	D-5	16.5-17.3	5.03-5.27									100
	S-7	31.0-32.0	9.45-9.75									
	S-8	40.0-40.8	12.19-12.44									100
	B-9	49.0-50.0	14.94-15.24									
LD-A-2	B-1	0.0-0.5	0.0-0.15						100	91	79	62
	S-2	5.0-6.4	1.52-1.95									
	S-3	10.0-11.1	3.05-3.38									
	S-4	15.0-15.9	4.57-4.85									
	S-5	20.0-20.4	6.10-1.48						100	97	87	69
	S-6	25.0-25.2	7.62-7.68									
	S-7	30.0-30.2	9.14-9.20									
	S-8	35.0-35.4	10.67-10.79							100	98	84
LD-A-3	B-1	0.0-0.5	0.0-0.15							100	99	97
	S-2	5.0-5.8	1.52-1.77									
	S-3	10.0-10.5	3.05-3.20									
	B-4	11.0-15.0	3.35-4.57							100	97	92
	S-5	15.0-16.5	4.57-5.03									
	S-7	20.0-20.8	6.10-6.34									
	S-8	25.0-26.5	7.62-8.08							100	91	72
	S-9	30.0-30.5	9.14-9.30									
	S-10	35.0-35.7	10.67-10.88						100	98	93	73
	S-11	40.0-40.7	12.19-12.41									
	S-12	45.0-45.8	13.72-13.96									
	S-13	50.0-51.0	15.24-15.54								100	97
LD-A-4	B-1	0.0-5.0	0.0-1.52							100	98	89
	D-2	5.7-6.2	1.74-1.89							100	99	94
	D-3	10.8-11.3	3.29-3.44							100	95	83
	D-4	15.6-16.1	4.75-4.91								100	97
	D-6	20.5-21.0	6.25-6.40									
	D-7	25.5-26.0	7.77-7.92							100	98	90
	D-8	30.5-31.0	9.30-9.45									
	D-9	35.5-36.0	10.82-10.97									
	D-10	40.5-41.0	12.34-12.50									
	D-11	45.5-46.0	13.87-14.02						100	97	93	82
	D-12	50.5-51.0	15.39-15.54									

*Indicates that test has been performed and results are included in this appendix.

FINER BY WEIGHT								ATTERBERG LIMITS			USCS	IN-SITU				COMPACTED			SPECIFIC GRAVITY OF SOLIDS
U S STANDARD SIEVE NO.						PARTICLE SIZE (mm)						DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		
	SAND					SILT OR CLAY				(pcf)		(kg/m³)						(pcf)	
7/8"	4	10	40	100	200	.005	.001	LL	PL	PI									
99	96	86	62	51	44			27	19	8	SC			1.9					
100	99	93	71	42	29					NP	SM			2.8					
											SM			4.3					
											SM			7.7					
		100	99	97	94	60	30	60	23	37	CH	109.2	1749	13.3	67.5	0.53		2.67	
								36	17	19	CL			5.5					
		100	98	96	86	18	12				ML			4.7					
											SM			4.8					
91	79	62	40	31	21	4	2			NP	SM			0.6					
											SM			0.6					
										NP	SM			1.1					
											SM			1.0					
97	87	69	44	27	19	7	6			NP	SM			1.3					
											SM			1.9					
											SM			1.0					
100	98	84	49	31	24	12	9				SC			2.8					
100	99	97	86	75	44	4	3			NP	SM			0.8					
											SC			2.5					
											SC			2.2					
100	97	92	49	34	26	12	8	46	22	24	SC			3.9					
											SC			2.8					
											SC			2.5					
100	91	72	42	24	18	5	3	28	20	8	SC			2.6					
											SC			0.7					
98	93	73	40	27	24	15	11	29	19	10	SC			1.9					
											SC			1.6					
											ML			4.7					
	100	97	83	70	58	15	10	34	20	14	CL			3.4					
100	98	89	64	47	32	6	5			NP	SM			1.0					
100	99	94	75	61	48	10	1	25	19	6	SC/SM	112.4	1800	5.4	29.0	0.50			
100	95	83	48	27	19	5	3	23	20	3	SM	108.3	1735	7.9	38.2	0.56			
	100	97	81	58	47	15	10	31	18	13	SC	112.5	1800	4.4	23.9	0.50			
											SC	95.2	1525	5.5	19.4	0.76		2.69	
100	98	90	64	43	33	11	7	29	20	9	SC	124.4	1990	3.9	30.0	0.36			
											SM	120.0	1920	5.7	38.1	0.40			
											SM	112.6	1800	4.7	25.5	0.50			
										NP	SM	112.8	1800	4.1	22.6	0.49			
97	93	82	56	35	20					NP	SM	118.6	1900	2.3	14.8	0.42			
											SM	119.7	1910	2.5	16.5	0.41			

his appendix.

2

BERG UNITS		USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAXIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
19	8	SC			1.9												
		NP			2.8												
		SM			4.3												
		SM			7.7												
23	37	CH	109.2	1749	13.3	67.5	0.53				2.67		*				
17	19	CL			5.5												
		ML			4.7												
		SM			4.8												
		NP			0.6												
		SM			0.6												
		NP			1.1												
		SM			1.0												
		NP			1.3												
		SM			1.9												
		SM			1.0												
		SC			2.8												
		NP			0.8												
		SC			2.5												
		SC			2.2												
22	24	SC			3.9												
		SC			2.8											*	
		SC			2.5												
20	8	SC			2.6												
		SC			0.7												
19	10	SC			1.9												
		SC			1.6												
		ML			4.7												
20	14	CL			3.4												
		NP			1.0												
19	6	SC/SM	112.4	1800	5.4	29.0	0.50						*				
20	3	SM	108.3	1730	7.9	38.2	0.56							*			
18	13	SC	112.5	1800	4.4	23.9	0.50										
		SC	95.2	1525	5.5	19.4	0.76				2.69				*		
20	9	SC	124.4	1990	3.9	30.0	0.36										
		SM	120.0	1920	5.7	38.1	0.40										
		SM	112.6	1800	4.7	25.5	0.50										
		NP	112.8	1800	4.1	22.6	0.49										
		NP	118.6	1900	2.3	14.8	0.42										
		SM	119.7	1910	2.5	16.5	0.41										

SUMMARY OF LABORATORY TEST RESULTS
PAGE 1 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
C-2

FUGRO NATIONAL, INC.

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT											
				STANDARD SIEVE OPENING						U S STANDARD SIEVE					
				BLDRS.	COBBLES		GRAVEL				SAND				
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	40	100	
LD-A-5	D-1	5.2-5.7	1.58-1.74												
	D-3	10.5-11.0	3.20-3.35							100	98	90	65	44	
	D-4	15.5-16.0	4.72-4.88												
	D-5	25.5-26.0	7.77-7.92							100	91	86	78	62	
	D-6	30.0-31.5	9.14-9.60							100	98	92	61	37	
	D-7	35.0-36.5	10.67-11.13												
	D-8	40.5-41.0	12.34-12.50												
	D-9	45.5-46.0	13.87-14.02						100	92	88	86	76	57	
	D-10	50.0-50.5	15.24-15.39					100	96	91	89	82	46	22	
LD-A-6	D-1	5.5-6.0	1.68-1.83												
	D-2	10.5-11.0	3.20-3.35												
	B-3	10.0-15.0	3.05-4.57							100	99	88	48	33	
	D-4	15.5-16.0	4.72-4.88												
	D-5	20.5-21.0	6.25-6.40												
	D-6	25.5-26.0	7.77-7.92						100	99	94	78	42	30	
	D-7	30.5-31.0	9.30-9.45												
	S-8	36.5-37.1	11.13-11.31												
	D-9	40.5-41.0	12.34-12.50							100	96	83	53	41	
	D-10	45.5-46.0	13.87-14.02							100	78	51	22	12	
	D-11	50.5-51.0	15.39-15.54												
LD-A-7	D-1	5.0-5.1	1.52-1.55												
	D-2	10.5-11.0	3.20-3.35							100	97	91	77	39	22
	S-3	16.5-17.5	5.03-5.33												
	B-4	10.0-20.0	3.05-6.10							100	99	95	82	35	14
	D-6	22.0-22.5	6.71-6.86							100	96	85	61	30	11
	S-7	28.0-29.2	8.53-8.90												
	D-8	32.0-32.5	9.75-9.91												
	D-9	35.5-36.0	10.82-10.97												
	D-10	41.5-42.0	12.65-12.80							100	88	68	37	22	
	D-11	47.0-47.5	14.33-14.48												
LD-A-8	D-1	5.0-5.5	1.52-1.68												
	D-2	10.5-11.0	3.20-3.35										100	9	
	B-3	10.0-15.0	3.05-4.57							100	99	99	96	75	5
	D-4	15.5-16.0	4.72-4.88												
	D-5	20.5-21.0	6.25-6.40												
	D-6	25.5-26.0	7.77-7.92									100	99	7	
	D-7	30.0-30.4	9.14-9.27									100	97	6	
	D-8	36.0-36.5	10.97-11.13												
	S-9	40.5-41.4	12.34-12.62							100	99	97	90	71	4
	S-11	46.5-46.9	14.17-14.30												

*Indicates that test has been performed and results are included in this appendix.

FINER BY WEIGHT								ATTERBERG LIMITS			USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS
U S STANDARD SIEVE NO.					PARTICLE SIZE (mm)		DRY UNIT WEIGHT					MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)			
SAND				SILT OR CLAY		(pcf)	(kg/m ³)								(pcf)	(kg/m ³)				
3/8"	4	10	40	100	200	.005	.001	LL	PL	PI										
											SP/SM	122.6	1964	2.9	20.7	0.37				
100	98	90	65	44	33	10	5	36	19	17	SC									
											SM	113.4	1816	1.7	9.4	0.49				
100	91	86	78	62	36	9	4	32	23	9	SC	109.2	1749	6.3	31.3	0.54				
100	98	92	61	32	11						SP/SM			1.1						
											SP/SM			2.1						
											SP/SM	121.0	1938	2.2	14.8	0.39				
92	88	86	76	57	30	7	5				NP SM	103.2	1653	5.5	24.3	0.60				2.65
91	89	82	46	22	11	4	3				NP SP/SM	135.0	2162	1.3	14.5	0.25				
											SC	91.9	1472	2.8	8.9	0.83				
											SC	116.5	1866	4.4	26.6	0.45				
100	99	88	48	32	27	16	11	41	20	21	SC						132.0	2114	8.2	
											SC	112.0	1794	6.5	34.9	0.50				
											SC	115.5	1850	3.2	18.6	0.46				
99	94	78	42	30	22	9	6	68	29	39	SC	115.3	1847	4.9	28.4	0.46				
											SC	120.2	1925	3.4	22.9	0.40				
											SC			1.3						
100	96	83	53	42	33	15	11	40	18	22	SC	115.6	1852	6.8	41.7	0.43				2.65
100	78	51	22	12	9			36	26	10	SW/SM	117.8	1887	2.2	13.7	0.43				
											SC	105.3	1687	4.6	20.8	0.60				
											SW/SM			0.4						
97	91	77	39	22	13						NP SM	117.8	1887	0.9	6.1	0.39				2.62
											SW/SM			0.4						
99	95	92	35	16	9						NP SW/SM									
96	85	61	30	15	9	4	3				SW/SM	131.5	2106	0.5	5.0	0.28				
											SW/SM			0.4						
											SW/SM	105.6	1692	0.5	2.3	0.60				
											SW/SM	116.6	1868	3.9	23.8	0.45				
100	88	68	37	22	16						SM	116.8	1871	0.6	3.4	0.44				
											SM	121.0	1938	1.2	8.1	0.39				
											SC	100.7	1613	5.5	22.1	0.67				
			100	94	48	17	11	39	21	18	SC	104.2	1669	8.2	37.8	0.57				2.62
99	99	96	75	51	34	14	9	32	21	11	SC			5.9						
											SM	107.0	1714	2.7	12.9	0.57				
											SM	109.5	1754	3.0	15.2	0.54				
			100	99	75	51	9	7			NP ML	121.0	1938	7.4	50.9	0.40				
			100	97	84	40	7	4			NP SM			2.5						
											SM	125.9	2017	4.8	38.3	0.34				2.70
99	97	90	71	46	32	9	6				NP SM			1.6						
											SM			2.7						

As appendix.

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ATTENBERG LIMITS			USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAXIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
				DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
L	PL	PI		(pcf)	(kg/m³)								(pcf)	(kg/m³)				
			SP/SM	122.6	1964	2.9	20.7	0.37										
1	19	17	SC														*	
			SM	113.4	1816	1.7	9.4	0.49										
2	23	9	SC	109.2	1749	6.3	31.3	0.54								*		
			SP/SM			1.1												
			SP/SM			2.1												
			SP/SM	121.0	1938	2.2	14.8	0.39										
			NP SM	103.2	1653	5.5	24.3	0.60				2.65						
			NP SP/SM	135.0	2162	1.3	14.5	0.25										
			SC	91.9	1472	2.8	8.9	0.83										
			SC	116.5	1866	4.4	26.6	0.45									*	
1	20	21	SC						132.0	2114	8.2							
			SC	112.0	1794	6.5	34.9	0.50										
			SC	115.5	1850	3.2	18.6	0.46						*				
8	29	39	SC	115.3	1847	4.9	28.4	0.46										
			SC	120.2	1925	3.4	22.9	0.40										
			SC			1.3												
0	18	22	SC	115.6	1852	6.8	41.7	0.43				2.65						
6	26	10	SW/SM	117.8	1887	2.2	13.7	0.43										
			SC	105.3	1687	4.6	20.8	0.60										
			SW/SM			0.4												
			NP SM	117.8	1887	0.9	6.1	0.39				2.62						
			SW/SM			0.4												
			NP SW/SM															
			SW/SM	131.5	2106	0.5	5.0	0.28										
			SW/SM			0.4												
			SW/SM	105.6	1692	0.5	2.3	0.60										
			SW/SM	116.6	1868	3.9	23.8	0.45										
			SM	116.8	1871	0.6	3.4	0.44										
			SM	121.0	1938	1.2	8.1	0.39										
			SC	100.7	1613	5.5	22.1	0.67										
21	18		SC	104.2	1669	8.2	37.8	0.57				2.62		*				
2	21	11	SC			5.9												
			SM	107.0	1714	2.7	12.9	0.57										
			SM	109.5	1754	3.0	15.2	0.54									*	
			NP ML	121.0	1938	7.4	50.9	0.40										
			NP SM			2.5												
			SM	125.9	2017	4.8	38.3	0.34				2.70						
			NP SM			1.6												
			SM			2.7												

SUMMARY OF LABORATORY TEST RESULTS
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LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSQ

TABLE
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FUGRO NATIONAL, INC.

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BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT										
				STANDARD SIEVE OPENING							U S STANDARD SIEVE			
				BLDRS.	COBBLES		GRAVEL				SAND			
				24"	12"	6"	3"	1½"	¾"	3/8"	4	10	40	100
LD-A-8	S-12	50.0-50.8	15.24-15.48											
LD-A-9	B-1	0.5-1.5	0.15-0.46						100	99	90	64	26	7
	S-2	5.0-6.0	1.52-1.83											
	B-3	5.0-10.0	1.52-3.05							100	97	79	39	18
	S-4	10.0-11.0	3.05-3.35											
	S-5	15.0-16.3	4.57-4.97											
	S-6	20.0-21.2	6.10-6.16								100	95	38	14
	S-7	25.0-26.1	7.62-7.96											
	S-8	30.0-30.3	9.14-9.24											
	S-9	35.0-36.0	10.67-10.97						100	97	91	74	41	23
	D-10	37.0-37.5	11.28-11.43											
	S-11	40.5-41.0	12.34-12.50											
	S-12	45.0-45.9	13.72-13.99											
	D-13	50.1-50.5	15.27-15.39					100	82	74	64	51	29	17
LD-A-10	D-1	5.5-6.0	1.68-1.83											
	B-2	5.0-10.0	1.52-3.05							100	97	89	62	47
	D-3	10.5-11.0	3.20-3.35							100	99	88	59	40
	D-4	15.5-16.0	4.72-4.88											
	D-5	20.5-21.0	6.25-6.40								100	93	66	39
	D-6	25.5-26.0	7.77-7.92											
	D-7	30.5-31.0	9.30-9.45											
	D-8	35.5-36.0	10.82-10.97							100	99	92	66	47
	D-9	40.5-41.0	12.34-12.50											
	D-10	45.5-46.0	13.87-14.02											
	D-11	50.5-51.0	15.39-15.54							100	97	92	70	52
LD-A-11	B-1	0.0-0.5	0.0-0.15						100	98	88	74	48	37
	S-2	6.5-8.0	1.98-2.44						100	96	94	90	66	45
	D-3	10.0-10.5	3.05-3.20											
	S-4	16.5-17.5	5.03-5.33						100	99	96	87	46	23
	S-5	21.5-21.8	6.55-6.64											
	S-7	31.5-32.5	9.60-9.91								100	96	66	
	S-8	40.5-40.8	12.34-12.44											
LD-A-12	D-1	5.5-6.0	1.68-1.83											
	D-2	10.5-11.0	3.20-3.35							100	99	95	81	64
	B-3	6.0-13.5	1.83-4.11								100	96	69	54
	B-4	15.0-15.1	4.57-4.60											
	D-5	20.0-20.3	6.10-6.19								100	98	75	56
	B-6	30.0-30.1	9.14-9.17											
	S-7	40.0-41.3	12.19-12.59										100	84

*Indicates that test has been performed and results are included in this appendix.

PERCENT FINER BY WEIGHT									ATTERBERG LIMITS			USCS	IN-SITU					COMPACTED		
NO.		U S STANDARD SIEVE NO.						PARTICLE SIZE (mm)					DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		O-TIMUM MOISTURE (%)
REL		SAND					SILT OR CLAY			LL	PL	PI	(pcf)	(kg/m ³)				(pcf)	(kg/m ³)	
3/4"	3/8"	4	10	40	100	200	.005	.001				SM			3.3					
												SP								
100	99	90	64	26	7	3						SM			0.5					
	100	97	79	39	18	14						NP SM			1.6					
												SM			1.5					
												SW/SM			0.6					
		100	95	38	14	8						NP SW/SM			1.1					
												SM			0.5					
												SM			0.4					
100	97	91	74	41	23	15						NP SM			1.8					
												SW/SM	113.9	1825	4.8	26.9	0.48			
												NP SW/SM			1.8					
												SM			1.4					
82	74	64	51	29	17	13						NP SM			3.3					
												SC	112.4	1800	5.7	30.9	0.50			
	100	97	89	62	47	38	16	10	47	20	27	SC	112.3	1799	4.2	22.8	0.50			
	100	99	88	59	40	34	14	7	36	22	14	SC	117.6	1884	4.3	28.3	0.41			
		100	93	66	39	26	8	7				NP SM	119.5	1914	2.3	18.4	0.41			
												SM	119.6	1916	4.2	29.1	0.38			
												SM	117.8	1887	5.1	33.4	0.40			
	100	99	92	66	47	36	7	4				NP SM	123.9	1985	3.2	24.2	0.36			
												SM	107.4	1720	5.2	25.7	0.54			
												SM	114.9	1841	4.6	27.7	0.44			
	100	97	92	70	52	38	11	7	24	21	3	SM	115.7	1853	4.0	24.9	0.43			
100	98	88	74	48	37	30						NP SM			0.4					
100	96	94	90	66	45	28	8	5				NP SM			1.9					
												SM			0.5					
100	99	96	87	46	23	14						SM			0.6					
												SM			0.5					
			100	96	66	19						SM			1.6					
												SM			0.8					
												SC	122.3	1959	3.7	26.7	0.38			
	100	99	95	81	64	41	13	1	27	19	8	SC	108.4	1736	3.4	16.8	0.54			
		100	96	69	54	46	20	13	28	16	12	SC								
												SC			3.1					
		100	98	75	58	37	14	11	32	20	12	SC	118.3	1895	3.6	23.1	0.43			
												SC			1.8					
				100	84	30	8	7				SM			1.8					

in this appendix.

ATTERBERG LIMITS			USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
				DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
				(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
			SM			3.3												
			SP															
			SM			0.5												
		NP	SM			1.6												
			SM			1.5												
			SW/SM			0.6											*	
		NP	SW/SM			1.7												
			SM			0.5												
			SM			0.4												
		NP	SM			1.8												
			SW/SM	113.9	1825	4.8	26.9	0.48										
		NP	SW/SM			1.8												
			SM			1.4												
		NP	SM			3.3												
			SC	112.4	1800	5.7	30.9	0.50						*				
7	20	27	SC															
6	22	14	SC	112.3	1799	4.2	22.8	0.50							*			
			SC	117.6	1884	4.3	28.3	0.41									*	
		NP	SM	119.5	1914	2.8	18.4	0.41								*		
			SM	119.6	1916	4.2	29.1	0.38										
			SM	117.8	1887	5.1	33.4	0.40										
		NP	SM	123.9	1985	3.2	24.2	0.36				2.70						
			SM	107.4	1720	5.2	25.7	0.54										
			SM	114.9	1841	4.6	27.7	0.44										
4	21	3	SM	115.7	1853	4.0	24.9	0.43										
		NP	SM			0.4												
		NP	SM			1.9												
			SM			0.5												
			SM			0.6												
			SM			0.5												
			SM			1.6												
			SM			0.8												
			SC	122.3	1959	3.7	26.7	0.38										
7	19	8	SC	108.4	1736	3.4	16.8	0.54				2.68	*					
8	16	12	SC															
			SC			3.1												
2	20	12	SC	118.3	1895	3.6	23.1	0.43										
			SC			1.8												
			SM			1.8												

SUMMARY OF LABORATORY TEST RESULTS
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LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

TABLE
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UGRO NATIONAL, INC.

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING							U S STANDARD SIE		
				BLDRS	COBBLES		GRAVEL				SAND		
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	40
LD-A-12	S-8	50.0-51.1	15.24-15.58										
LD-B-1	P-1	5.0-5.6	1.52-1.71										
	P-2	10.0-10.6	3.05-3.23									100	61
	P-3	15.0-15.6	4.57-4.75							100	97	86	61
	P-3	15.6-16.1	4.75-4.91										
	P-4	20.0-20.6	6.10-6.28										
	P-4	20.6-21.2	6.28-6.16										
	P-4	21.2-21.8	6.46-6.64						100	99	96	81	45
	P-5	30.0-30.6	9.14-9.33							100	96	81	54
	P-5	30.6-31.7	9.33-9.66										
	P-6	40.0-42.0	12.19-12.80										
	P-7	50.0-50.8	15.24-15.48						100	96	87	70	41
	P-8	60.0-61.4	18.29-18.71										
	P-9	70.0-70.5	21.34-21.49										
	P-10	80.0-80.6	24.38-24.57							100	99	88	70
	P-10	80.6-81.2	24.57-24.75										
	P-11	90.0-91.1	27.43-27.77						100	97	88	76	53
	P-12	100.0-100.3	30.48-30.57										
	P-14	125.0-126.1	38.10-38.44					100	86	86	83	76	56
LD-B-2	D-2	5.0-6.5	1.52-1.98							100	98	70	12
	D-3	10.0-11.0	3.20-3.35									100	85
	S-4	16.5-18.0	5.03-5.49										
	S-5	21.5-23.0	6.55-7.01										
	S-6	30.0-31.5	9.14-9.60						100	99	92	75	25
	S-7	40.0-41.5	12.19-12.65										
	S-8	50.0-51.5	15.24-15.70										
	S-9	60.0-61.5	18.29-18.75										
	S-10	70.0-71.5	21.34-21.79						100	98	93	79	35
	S-11	80.0-81.5	24.38-24.84										
	S-12	90.0-91.5	27.43-27.89									100	99
	D-13	100.0-101.0	30.48-30.78									100	97
LD-B-3	D-2	5.0-6.0	1.52-1.83							100	96	87	43
	S-3	11.0-12.5	3.20-3.81										
	S-4	15.0-16.5	4.57-5.03					100	90	85	81	72	39
	S-5	20.0-20.2	6.10-6.16										
	S-6	30.0-30.1	9.14-9.17										
	S-7	40.0-40.4	12.19-12.31							100	97	90	60
	S-10	50.0-50.3	15.24-15.33										
	S-13	60.0-60.2	18.29-18.35								100	97	79
	B-14	60.0-65.0	18.29-19.81										

*Indicates that test has been performed and results are included in this appendix.

PERCENT FINER BY WEIGHT									ATTERBERG LIMITS			USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY
		U S STANDARD SIEVE NO.				PARTICLE SIZE (mm)							DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)	
SAND		SILT OR CLAY			(pcf)	(kg/m³)	(pcf)	(kg/m³)	(pcf)	(kg/m³)											
1/4"	3/8"	4	10	40							100		200	.005				.001	LL		
												SM			1.7						
									34	21	13	SC	124.6	1996	5.9	45.2	0.35				
									28	18	10	SC	119.5	1914	6.3	41.1	0.41				
	100	97	100	61	43	32	10	6	23	17	6	SC/SM	119.0	1906	11.1	75.5	0.39				
			86	61	47	35	11	6				SC/SM	126.9	2033	8.0	65.7	0.33				
												SC	117.0	1874	9.1	55.8	0.44				
									31	20	11	SC	107.9	1728	10.9	52.6	0.56				
100	99	96	81	45	30	23					NP	SM	115.2	1845	9.1	53.1	0.46				
	100	96	81	54	36	27			27	21	6	SC/SM	115.4	1849	9.9	67.6	0.40				
												SC/SM	117.9	1889	11.4	72.0	0.43				
												SC/SM	121.8	1951	9.0	63.7	0.38				
100	96	87	70	41	29	22			38	20	18	SC	117.0	1874	11.4	70.0	0.44				
												SC	118.5	1898	8.5	54.4	0.42				
												SC	120.1	1924	10.2	68.2	0.40				
	100	99	88	70	54	43	12	7	27	19	8	SC	113.1	1812	9.5	71.7	0.36				
												SC	123.7	1981	7.2	53.9	0.36				
100	97	88	76	53	38	29	9	5	31	23	8	SC	116.9	1873	10.8	66.0	0.44				
												Rock			7.6						
86	86	83	76	56	37	26	1	0				Rock	125.2	2006	8.0						
	100	98	70	12	6	4						SP			0.3						
			100	85	18	8						SP/SM	103.7	1661	1.0	4.3	0.63				
												SM			0.5						
												SM			0.8						
100	99	92	75	25	9	6						SW/SM			0.2						
												SW/SM			1.1						
												SW/SM			0.2						
												SW/SM			0.3						
100	98	93	79	35	15	11						SW/SM			0.4						
												SW/SM			0.3						
			100	99	99	97			38	23	15	CL			3.8						
			100	97	95	90	46	26	40	17	23	CL	116.8	1871	14.7	89.8	0.43				
	100	96	87	43	14	7						SW/SM			9.4						
												SW/SM			1.1						
90	85	81	72	39	21	14						SM			0.9						
												SM			0.3						
												SM			0.6						
	100	97	90	60	36	26						SM			1.1						
												SM			1.6						
	100	97	79	55	43	12	7					SM			0.8						
												SM			1.2						

this appendix.

TERBERG LIMITS		USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
		SM			1.7												
21	13	SC	124.6	1996	5.9	45.2	0.35										
18	10	SC	119.5	1914	6.3	41.1	0.41							*			
17	6	SC/SM	119.0	1906	11.1	75.5	0.39				2.65		*				
		SC/SM	126.9	2033	8.0	65.7	0.33										
		SC	117.0	1874	9.1	55.8	0.44					*					
20	11	SC	107.9	1728	10.9	52.6	0.56										
	NP	SM	115.2	1845	9.1	53.1	0.46								*		
21	6	SC/SM	115.4	1849	9.9	67.6	0.40						*				
		SC/SM	117.9	1889	11.4	72.0	0.43										
		SC/SM	121.8	1951	9.0	63.7	0.38										
20	18	SC	117.0	1874	11.4	70.0	0.44										
		SC	118.5	1898	8.5	54.4	0.42										
		SC	120.1	1924	10.2	68.2	0.40										
19	8	SC	113.1	1812	9.5	71.7	0.36						*				
		SC	123.7	1981	7.2	53.9	0.36										
23	8	SC	116.9	1873	10.8	66.0	0.44										
		Rock			7.6												
		Rock	125.2	2006	8.0												
		SP			0.3												
		SP/SM	103.7	1661	1.0	4.3	0.63							*			
		SM			0.5											*	
		SM			0.8												
		SW/SM			0.2												
		SW/SM			1.1												
		SW/SM			0.2												
		SW/SM			0.3												
		SW/SM			0.4												
		SW/SM			0.3												
23	15	CL			3.8												
17	23	CL	116.8	1871	14.7	89.8	0.43				2.67		*				
		SW/SM			9.4												
		SW/SM			1.1												
		SM			0.9												
		SM			0.3												
		SM			0.6												
		SM			1.1												
		SM			1.6												
		SM			0.8												
		SM			1.2												

SUMMARY OF LABORATORY TEST RESULTS
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MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAUSO

TABLE
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FUGRO NATIONAL, INC.

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BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING							U S STANDARD S		
				BLORS.	COBBLES		GRAVEL				SAND		
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	40
LD-B-3	S-16	70.0-70.2	21.34-21.40										
LD-B-4	B-1	0.0-5.0	0.0-1.52							100	92	74	35
	S-1	5.0-6.5	1.52-1.98										
	B-2	5.0-10.0	1.52-3.05						100	98	92	76	38
	S-3	10.0-11.5	3.05-3.51										
	S-5	15.0-16.5	4.57-5.03						100	98	90	74	34
	S-8	20.0-20.2	6.10-6.16										
	S-9	30.0-30.2	9.14-9.20						100	94	91	85	53
	S-10	40.0-40.4	12.19-12.31										
	S-11	50.0-50.3	15.24-15.33										
	S-12	60.0-60.4	18.29-18.41										
	S-13	70.0-70.4	21.34-21.46										
	S-14	80.0-80.3	24.38-24.48										
	S-15	90.0-90.2	27.43-27.49										
	S-16	100.0-100.3	30.48-30.57						100	86	74	61	33
LD-B-5	B-1	0.0-5.0	0.0-1.52							100	92	77	48
	S-2	6.0-7.5	1.83-2.29										
	S-3	10.0-10.5	3.05-3.20										
	B-4	10.0-15.0	3.05-4.57						100	99	88	78	61
	S-5	15.0-15.5	4.57-4.72										
	S-6	20.0-20.2	6.10-6.16										
	S-7	30.0-30.2	9.14-9.20										
	S-8	40.0-40.2	12.19-12.25						100	98	96	83	51
	S-9	55.0-55.2	16.76-16.82										
	S-10	75.0-75.3	22.86-22.95								100	95	61
	S-11	100.0-100.1	30.48-30.51										
LD-B-6	B-1	0.0-5.0	0.0-1.52							100	98	92	72
	S-2	5.0-6.0	1.52-1.83								100	99	87
	S-3	10.0-10.7	3.05-3.26										
	B-4	10.0-15.0	3.05-4.57						100	98	89	64	
	S-5	15.0-15.8	4.57-4.82										
	S-6	20.0-21.2	6.10-6.46							100	99	96	68
	S-7	30.0-31.5	9.14-9.60										
	S-8	40.0-41.5	12.19-12.65						100	99	97	85	53
	S-9	50.0-51.5	15.24-15.70										
	S-10	60.0-60.8	18.29-18.53										
	S-11	70.0-71.5	21.34-21.79							100	97	87	52
	S-12	80.0-80.8	24.38-24.63										
	S-13	90.0-91.5	27.43-27.89						100	99	96	83	37
	S-14	100.0-100.9	30.48-30.75										

*Indicates that test has been performed and results are included in this appendix.

SOLIDS BY WEIGHT								ATTERBERG LIMITS			USCS	IN-SITU				COMPACTED			SPECIFIC GRAVITY OF SOLIDS
U S STANDARD SIEVE NO.					PARTICLE SIZE (mm)							DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		
	SAND				SILT OR CLAY			LL	PL	PI		(pcf)	(kg/m ³)				(pcf)	(kg/m ³)	
NO.	4	10	40	100	200	.005	.001												
											SM			0.9					
90	92	74	35	21	15						SM								
98	92	76	38	23	17					NP	SM			0.6					
											SM			0.7					
98	90	74	34	17	11						SW/SM			0.4					
											SM			0.7					
94	91	85	53	30	21						SM			0.8					
											SM			0.7					
											SM			0.6					
											SM			0.9					
											SM			0.4					
											SM			0.7					
											SM			1.1					
96	74	61	33	19	13						SM			0.9					
90	92	77	48	22	13					NP	SM								
											SM			0.6					
											SM			0.8					
99	88	78	61	39	27	7	4			NP	SM								
											SM			1.3					
											SM			0.5					
											SM			0.7					
98	96	83	51	35	24	8	5				SM			0.5					
											SM			0.4					
	100	95	61	40	27						SM			0.5					
											SM			0.4					
90	98	92	72	48	36	6	4			NP	SM								
	100	99	87	73	58	20	14	26	17	9	CL			2.2					
								53	27	26	SC			3.6					
90	98	89	64	48	39	16	11	46	23	23	SC					128.8	2063	9.6	
											SC			2.9					
90	99	96	68	53	45	12	6	30	16	14	SC			2.1					
											SM			2.4					
99	97	85	53	36	28	10	7	34	18	16	SC			1.2					
											SM			1.0					
											SM			1.2					
90	97	87	52	31	19	6	5			NP	SM			1.3					
											SM			1.7					
99	96	83	37	14	7						SW/SM			0.6					
											SM			1.8					

appendix.

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CHECKED BY _____ APPROVED BY _____

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S	
				BLDRS	COBBLES		GRAVEL					4	10
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"			
LD-B-7	D-1	5.5-6.0	1.68-1.83									100	
	D-2	10.5-11.0	3.20-3.35										
	B-3	10.0-15.0	3.05-4.57								100	98	
	D-4	15.5-16.0	4.72-4.88										
	D-5	20.6-21.0	6.25-6.40								100	95	
	D-6	30.5-31.0	9.30-9.45										
	D-7	40.5-41.0	12.34-12.50										
	D-8	50.5-51.0	15.39-15.54										
	D-9	60.5-61.0	18.44-18.59								100	99	
	D-10	70.1-70.6	21.37-21.52										
	D-11	90.0-90.2	27.43-27.49								100	99	
	D-12	100.5-101.0	30.63-30.78										
LD-B-8	S-1	5.0-6.0	1.52-1.83								100	92	
	S-2	10.0-11.0	3.05-3.35										
	S-3	15.0-16.5	4.57-5.03										
	S-4	20.0-21.5	6.10-6.55										
	S-5	30.0-30.5	9.14-9.30									100	
	S-6	40.0-40.8	12.19-12.44										
	S-7	50.0-50.3	15.24-15.33										
	S-8	60.0-60.3	18.29-18.38										
	S-9	70.0-71.0	21.34-21.64										
	S-10	80.0-81.2	24.38-24.75										
	S-11	90.0-91.3	27.43-27.83										10
	S-12	100.0-101.3	30.48-30.88									100	9
LD-B-9	D-1	5.5-6.0	1.68-1.83										
	D-2	10.5-10.9	3.20-3.32										
	D-3	15.5-16.0	4.72-4.88								100	98	
	D-4	20.5-21.0	6.25-6.40								100	98	94
	D-5	30.5-31.0	9.30-9.45										
	D-6	40.5-41.0	12.34-12.50								100	99	96
	D-7	50.5-51.0	15.39-15.54								100	98	91
	D-8	60.5-61.0	18.44-18.59										
	D-9	70.5-71.0	21.49-21.64								100	98	95
	D-10	80.5-81.0	24.54-24.69										
	D-11	90.5-91.0	27.58-27.74										10
	D-12	100.5-101.0	30.63-30.78										
LD-B-10	D-1	5.2-5.7	1.58-1.74									100	
	D-2	10.5-11.0	3.20-3.35										
	B-3	10.0-15.0	3.10-4.57								100	97	
	D-4	15.5-16.0	4.72-4.88								100	98	

*Indicates that test has been performed and results are included in this appendix.

PERCENT FINER BY WEIGHT									ATTERBERG LIMITS			USCS	IN-SITU				COMPACTED			SPECIFIC GRAVITY		
		U S STANDARD SIEVE NO.				PARTICLE SIZE (mm)							DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY			OPTIMUM MOISTURE (%)	
4"	3/8"	4	10	40	100	200	.005	.001	LL	PL	PI		(pcf)	(kg/m³)				(pcf)	(kg/m³)			
		100	95	72	56	46	17	2	30	20	10	SC	112.7	1805	4.6	25.3	0.49					
									28	19	9	SC	116.0	1858	4.1	24.7	0.45					
	100	98	89	64	43	29	10	8	27	22	5	SM/SC										
												SC	120.0	1922	3.7	25.7	0.38					
	100	95	77	41	23	16						NP	121.4	1945	2.2	15.5	0.39					
												SC	109.6	1756	5.1	26.5	0.51					
												SM/SC	112.5	1802	5.1	27.4	0.50					
												SM/SC	115.6	1852	3.2	18.8	0.46					
	100	99	90	56	32	22	8	4	33	20	13	SC	122.6	1964	4.3	31.9	0.36				2	
									36	28	8	SM/SC	122.8	1967	2.5	18.0	0.37					
	100	99	96	79	30	8						SP/SM	97.5	1562	1.7	6.2	0.73					
												SP/SM	105.0	1682	3.2	15.4	0.55					
	100	92	80	53	38	29	8	4	36	25	11	SM			3.2							
									29	20	9	SC			3.9							
												SM/SC			2.0							
												SM/SC			1.5							
		100	92	70	51	31	9	4	31	23	8	SC			2.6							
												SM/SC			2.9							
												SM/SC			1.4							
												SC			1.4							
											NP	SM			0.5							
												SM/SC			1.3							
			100	98	36	7						SP/SM			0.7							
		100	97	92	74	29					NP	SM			2.4							
												SC	107.7	1725	3.9	18.5	0.57					
												SC	119.3	1911	4.8	31.3	0.41					
	100	98	91	64	45	31	10	7	23	19	4	SM/SC	116.8	1871	3.2	19.3	0.45					
00		98	94	77	42	24	16	4	3			NP	SM/SC	115.2	1845	2.1	12.0	0.46				
												SC	110.3	1767	5.5	28.0	0.53					
00		99	96	82	51	34	20	6	4	25	20	5	SM	115.2	1845	3.3	20.3	0.44				
00		98	91	78	46	28	19	5	3			NP	SM	124.4	1993	3.0	22.8	0.35				
										37	24	13	SC	115.3	1847	4.9	30.2	0.44				
00		98	95	76	48	25	14	4	2			NP	SM	116.0	1858	3.1	19.0	0.43				
													SM/SC	112.5	1802	3.8	20.7	0.50				
			100	88	35	7						SP/SM	107.3	1719	1.9	9.6	0.54					
												SM	102.9	1648	5.1	21.6	0.64					
		100	86	52	31	27	16	9	32	17	15	SC	113.6	1820	4.3	23.8	0.48					
												SC	102.7	1645	4.7	19.8	0.64					
	100	97	87	57	42	32	10	7	36	21	15	SC			3.3							
	100	98	80	43	27	20	7	5	35	22	13	SC	119.2	1909	3.3	21.3	0.41					

in this appendix.

TERBERG LIMITS			USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAXIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
				DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
				(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
	20	10	SC	112.7	1805	4.6	25.3	0.49										
	19	9	SC	116.0	1858	4.1	24.7	0.45						*	*		*	
	22	5	SM/SC															
			SC	120.0	1922	3.7	25.7	0.38										
		NP	SM	121.4	1945	2.2	15.5	0.39										
			SC	109.6	1756	5.1	26.5	0.51										
			SM/SC	112.5	1802	5.1	27.4	0.50										
			SM/SC	115.6	1852	3.2	18.8	0.46										
	20	13	SC	122.6	1964	4.3	31.9	0.36				2.67						
	28	8	SM/SC	122.8	1967	2.5	18.0	0.37										
			SP/SM	97.5	1562	1.7	6.2	0.73										
			SP/SM	105.0	1682	3.2	15.4	0.55										
	25	11	SM			3.2												
	20	9	SC			3.9												
			SM/SC			2.0												
			SM/SC			1.5												
	23	8	SC			2.6												
			SM/SC			2.9												
			SM/SC			1.4												
			SC			1.4												
		NP	SM			0.5												
			SM/SC			1.3												
			SP/SM			0.7												
		NP	SM			2.4												
			SC	107.7	1725	3.9	18.5	0.57										
			SC	119.3	1911	4.8	31.3	0.41										
3	19	4	SM/SC	116.8	1871	3.2	19.3	0.45						*				
		NP	SM/SC	115.2	1845	2.1	12.0	0.46										
			SC	110.3	1767	5.5	28.0	0.53										
5	20	5	SM	115.2	1845	3.3	20.3	0.44										
		NP	SM	124.4	1993	3.0	22.8	0.35										
7	24	13	SC	115.3	1847	4.9	30.2	0.44										
		NP	SM	116.0	1858	3.1	19.0	0.43										
			SM/SC	112.5	1802	3.8	20.7	0.50										
			SP/SM	107.3	1719	1.9	9.6	0.54				2.64						
			SM	102.9	1648	5.1	21.6	0.64										
2	17	15	SC	113.6	1820	4.3	23.8	0.48							*			
			SC	102.7	1645	4.7	19.8	0.64										
6	21	15	SC			3.3												
5	22	13	SC	119.2	1909	3.3	21.3	0.41										

SUMMARY OF LABORATORY TEST RESULTS
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MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSQ

TABLE
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FUGRO NATIONAL, INC.

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3

APPROVED BY

CHECKED BY

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S	
		FEET	METERS	BLDRS.	COBBLES		GRAVEL						
				24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	
LD-B-10	D-5	20.5-21.0	6.25-6.40										
	D-6	30.6-31.0	9.33-9.45										
	D-7	40.5-41.0	12.34-12.50										
	D-8	50.5-51.0	15.39-15.54								100	99	
	D-9	60.5-61.0	18.44-18.59								100	98	
	D-10	70.5-71.0	21.49-21.64										
	D-11	80.5-81.0	24.54-24.69										1
LD-B-11	D-1	5.5-6.0	1.68-1.83								100	98	
	D-2	10.5-11.0	3.20-3.32								100	99	
	D-3	15.5-16.0	4.72-4.88										
	D-4	20.5-21.0	6.25-6.40										
	B-5	20.0-25.0	6.10-7.62						100	99	95		
	D-6	30.5-31.0	9.30-9.45									100	
	D-7	40.5-41.0	12.34-12.50								100	99	
	D-8	50.5-51.0	15.39-15.54										
	D-9	60.5-61.0	18.44-18.59										
	D-10	70.5-71.0	21.49-21.64						100	98	87		
	D-11	80.5-81.0	24.54-24.69							100	99		
	D-12	90.5-91.0	27.58-27.74										
	D-13	100.5-101.0	30.63-30.78						100	93	76		
LD-B-12	D-1	5.5-6.0	1.68-1.83										
	B-2	0.0-8.5	0.0-2.59								100	94	
	D-3	10.5-11.0	3.20-3.32								100	92	
	D-4	15.3-15.8	4.66-4.82						100	97	93		
	B-5	20.0-20.4	6.10-6.22										
	S-6	30.5-30.9	9.30-9.42								100	92	
	S-7	40.0-40.3	12.19-12.28										
	S-8	50.0-50.4	15.24-15.36										
	S-9	60.0-60.2	18.29-18.35										
	S-10	70.0-70.8	21.34-21.58						100	96	87		
	B-11	74.0-80.0	22.56-24.38										
	S-12	90.0-90.8	27.43-27.68										
	S-13	100.0-100.5	30.48-30.63										
LD-B-13	D-1	5.0-5.1	1.52-1.55										
	S-2	10.0-11.0	3.05-3.35					100	83	68	64		
	B-3	10.0-15.0	3.05-4.57					100	97	86	74		
	S-4	15.0-16.5	4.57-5.03					100	96	83	73		
	S-5	20.0-20.4	6.10-6.22										
	S-6	30.0-30.3	9.14-9.24					100	68	52	46		
	S-7	40.0-40.3	12.19-12.28										

*Indicates that test has been performed and results are included in this appendix.

PERCENT FINER BY WEIGHT											ATTERBERG LIMITS			USCS	IN-SITU					COMPACTION	
SIEVE OPENING				U S STANDARD SIEVE NO.						PARTICLE SIZE (mm)					DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY	
GRAVEL				SAND				SILT OR CLAY			LL	PL	PI		(pcf)	(kg/m ³)				(pcf)	(kg/m ³)
3"	1 1/2"	3/4"	3/8"	4	10	40	100	200	.005	.001											
														SC	114.2	1829	3.0	17.1	0.48		
														SM	104.5	1674	2.8	12.3	0.62		
														SC	102.0	1634	5.1	21.2	0.65		
			100	99	90	49	29	20	5	3				NP	117.6	1884	2.2	13.6	0.43		
			100	98	90	64	46	32	5	4	35	20	15	SC	105.0	1682	4.7	21.0	0.60		
														SM	120.2	1925	2.7	18.2	0.40		
					100	84	68	51	11	5	26	19	7	CL/ML	113.0	1810	4.5	24.9	0.49		
			100	98	79	37	22	15	6	5	24	18	6	SM/SC	118.7	1901	1.4	9.0	0.42		
			100	99	93	69	48	39	13	9	38	18	20	SC	130.8	2095	3.5	33.1	0.29		
														SC	122.9	1969	2.1	15.2	0.37		
														SC	118.6	1900	1.6	10.5	0.42		
		100	99	95	82	42	27	20			40	22	18	SC							
				100	96	87	73	49	14	8	31	24	7	SM/ML	104.5	1674	4.3	19.1	0.61		
		100	99	90	70	55	41	10	6	6	32	19	13	SC	123.6	1980	3.1	23.3	0.36		
														SM	94.4	1512	2.0	6.9	0.79		
														SC	119.9	1921	2.4	15.9	0.41		
		100	98	87	67	32	19	13					NP	SM	115.8	1855	1.8	10.9	0.46		
			100	99	88	56	39	29	9	7	37	20	17	SC	113.2	1813	4.2	23.3	0.49		
														SC	119.8	1919	3.1	20.7	0.41		
		100	93	76	60	28	15	12			32	19	13	SW/SC	125.7	2014	2.2	17.3	0.34		
														SM/SC			0.7				
			100	94	76	41	23	16			25	20	5	SM/SC			1.2				
			100	92	62	35	21	16	9	4	25	15	10	SC	122.7	1965	2.5	16.9	0.41		
		100	97	93	79	49	32	28			32	21	11	SC	101.0	1618	4.5	18.2	0.67		
														SM			0.9				
			100	92	81	47	27	17						SM			1.6				
														SM			0.8				
														SM			0.9				
														SM			1.2				
			100	96	87	77	55	33	6	5			NP	SM			3.0				
														SM			0.4				
														SM			1.0				
														SM			1.9				
														SM			0.6				
		100	83	68	64	58	42	23	12					SP/SM			0.4				
		100	97	86	74	55	27	15	10				NP	SW/SM			1.7				
		100	96	83	73	61	35	22	18					SM			0.2				
														GP			0.3				
		100	68	52	46	38	24	15	10					GP/GM			0.3				
														SM			0.2				

Included in this appendix.

ATTERBERG LIMITS			USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
LL	PL	PI		DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
				(pcf)	(kg/m³)				(pcf)	(kg/m³)								
			SC	114.2	1829	3.0	17.1	0.48										
			SM	104.5	1674	2.8	12.3	0.61										
			SC	102.0	1634	5.1	21.2	0.65										
		NP	SM	117.6	1884	2.2	13.6	0.43				2.70						
35	20	15	SC	105.0	1682	4.7	21.0	0.60										
			SM	120.2	1925	2.7	18.2	0.40										
26	19	7	CL/ML	113.0	1810	4.5	24.9	0.49										
24	18	6	SM/SC	118.7	1901	1.4	9.0	0.42						*				
38	18	20	SC	130.8	2095	3.5	33.1	0.29										
			SC	122.9	1969	2.1	15.2	0.37										
			SC	118.6	1900	1.6	10.5	0.42										
40	22	18	SC															
31	24	7	SM/ML	104.5	1674	4.3	19.1	0.61				2.69				*		
32	19	13	SC	123.6	1980	3.1	23.3	0.36										
			SM	94.4	1512	2.0	6.9	0.79										
			SC	119.9	1921	2.4	15.9	0.41										
		NP	SM	115.8	1855	1.8	10.9	0.46										
37	20	17	SC	113.2	1813	4.2	23.3	0.49										
			SC	119.8	1919	3.1	20.7	0.41										
32	19	13	SW/SC	125.7	2014	2.2	17.3	0.34										
			SM/SC			0.7												
25	20	5	SM/SC			1.2												
25	15	10	SC	122.7	1965	2.5	16.9	0.41				2.77		*				
32	21	11	SC	101.0	1618	4.5	18.2	0.67										
			SM			0.9												
			SM			1.6												
			SM			0.8												
			SM			0.9												
			SM			1.2												
		NP	SM			3.0												
			SM			0.4												
			SM			1.0												
			SM			1.9												
			SM			0.6												
			SP/SM			0.4												
		NP	SW/SM			1.7												
			SM			0.2												
			GP			0.3												
			GP/GM			0.3												
			SM			0.2												

SUMMARY OF LABORATORY TEST RESULTS
PAGE 7 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
C-2

UGRO NATIONAL, INC.

2

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT								U S STA	
				STANDARD SIEVE OPENING									
		FEET	METERS	BLDRS.	COBBLES		GRAVEL			4	10		
24"	12"			6"	3"	1½"	3/4"	3/8"					
LD-B-13	S-8	50.0-50.8	15.24-15.48										
	S-9	70.0-70.8	21.34-21.58						100	99	98	94	
	S-10	80.0-80.3	24.38-24.47										
	S-11	90.0-90.4	27.43-27.55										
	S-12	100.0-100.3	30.48-30.57										
LD-B-14	D-1	5.0-5.1	1.52-1.55										
	B-2	5.0-10.0	1.52-3.05					100	87	79	74	60	
	D-2	12.0-12.5	3.66-3.81										
	S-3	17.4-17.8	5.30-5.43										
	S-4	20.0-21.1	6.10-6.43						100	81	73	60	
	S-5	30.0-30.9	9.14-9.42										
	D-6	31.5-32.0	9.60-9.75									100	
	D-7	40.4-40.9	12.31-12.46									100	
	D-8	50.5-51.0	15.39-15.54										
	D-9	60.5-61.0	18.44-18.59										
	D-10	72.0-72.5	21.95-22.10									100	
	S-11	81.8-82.8	24.93-25.24										
	D-12	90.2-90.7	27.49-27.74										
	D-13	101.0-101.4	30.78-30.91									100	
LD-B-15	B-1	0.0-2.5	0.0-0.76						100	92	88	75	
	D-2	5.5-6.0	1.68-1.83							100	98	84	
	B-3	8.0-10.0	2.44-3.05										
	D-4	10.5-11.0	3.20-3.32										
	B-5	14.0-15.0	4.27-4.57										
	B-6	19.0-20.0	5.79-6.10										
	B-7	23.0-24.5	7.01-7.47										
	B-8	28.0-29.5	8.53-8.99										
	D-9	30.2-30.5	9.20-9.29									100	
	B-10	32.0-34.0	9.75-10.36										
	D-11	40.3-40.8	12.28-12.43										
	B-12	42.0-43.0	12.80-13.11										
	B-13	45.0-47.5	13.72-14.48										
	B-14	50.0-52.0	15.24-15.85								100	94	
	B-15	52.0-56.0	15.85-17.07										
	B-16	59.0-60.0	17.98-18.29									100	
	B-17	60.0-61.0	18.29-18.59										
	B-18	66.5-67.5	20.27-20.57										
	B-18A	68.5-69.5	20.88-21.18										
	B-19	71.0-72.0	21.64-21.94								100	94	
	B-20	76.0-77.0	23.16-23.46										
B-21	80.0-81.0	24.38-24.69											

*Indicates that test has been performed and results are included in this appendix.

1/2"	3/4"	3/8"	4	10	40	100	200	.005	.001	LL	PL	PI		(pcf)	(kg/m³)	U	S	U	(pcf)	(kg/m³)
													SM			1.3				
	100	99	98	94	70	28	16	4	4				SM			1.0				
													SM			0.5				
													SM			0.6				
													SM			0.7				
													SW/SM			0.6				
100	87	79	74	60	29	13	9					NP	SW/SM							
												NP	SM	118.5	1898	3.0	19.4	0.42		
													SW/SM			0.5				
	100	81	73	60	25	10	6					NP	SP/SM			0.4				
													CH			3.8				
				100	91	68	32						SM	114.0	1826	3.5	19.6	0.48		
				100	99	24	3						SP	134.6	2156	1.5	16.0	0.25		
					100	79	18	2	1			NP	SM	106.6	1708	2.2	10.3	0.57		
						100	99	89	8	75	28	47	CH	97.1	1555	26.2	96.1	0.74		
				100	89	53	41						SM	97.4	1560	17.2	63.4	0.73		
													SM			0.7				
													SM	107.2	1717	4.6	21.9	0.57		
				100	99	34	3						SP	97.3	1559	3.1	11.3	0.73		
	100	92	88	75	44	23	14					NP	SM			1.0				
		100	98	84	38	14	11						SW/SM	108.1	1732	0.9	4.2	0.56		
													SM			2.3				
													SM	91.1	1459	3.3	10.3	0.85		
													SM			1.1				
													SM			1.0				
													CH			13.3				
													CH			20.9				
				100	96	94	92	73	54	91	27	64	CH	89.7	1437	19.6	60.1	0.88		
													SM			3.0				
													SM	99.3	1591	1.8	6.8	0.70		
													SM			2.3				
													SM			2.3				
				100	99	89	25	15					SM			2.1				
													SM			3.0				
				100	96	78	69	53	44	74	23	51	CH			18.7				
													SM			3.9				
													CH			22.0				
													SM			4.5				
				100	99	97	36	7				NP	SP/SM			1.3				
													SP/SM			1.1				
													CH			4.6				

led in this appendix.

ORG #S	USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
		DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
		(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
	SM			1.3												
	SM			1.0												
	SM			0.5												
	SM			0.6												
	SM			0.7												
	SW/SM			0.6												
NP	SW/SM															
NP	SM	118.5	1898	3.0	19.4	0.42										
	SW/SM			0.5												
NP	SP/SM			0.4												
	CH			3.8												
	SM	114.0	1826	3.5	19.6	0.48										
	SP	134.6	2156	1.5	16.0	0.25										
NP	SM	106.6	1708	2.2	10.3	0.57				2.68						
47	CH	97.1	1555	26.2	96.1	0.74						*				
	SM	97.4	1560	17.2	63.4	0.73										
	SM			0.7												
	SM	107.2	1717	4.6	21.9	0.57										
	SP	97.3	1559	3.1	11.3	0.73										
NP	SM			1.0												
	SW/SM	108.1	1732	0.9	4.2	0.56										
	SM			2.3												
	SM	91.1	1459	3.3	10.3	0.85									*	
	SM			1.1												
	SM			1.0												
	CH			13.3												
	CH			20.9												
7 64	CH	89.7	1437	19.6	60.1	0.88										
	SM			3.0												
	SM	99.3	1591	1.8	6.8	0.70										
	SM			2.3												
	SM			2.3												
	SM			2.1												
	SM			3.0												
3 51	CH			18.7												
	SM			3.9												
	CH			22.0												
	SM			4.5												
NP	SP/SM			1.3												
	SP/SM			1.1												
	CH			4.6												

SUMMARY OF LABORATORY TEST RESULTS
PAGE 8 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS

TABLE
C-2

FUGRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S STAMP	
		FEET	METERS	BLDRS	COBBLES		GRAVEL				SAND		
24"	12"			6"	3"	1½"	3/4"	3/8"	4	10			
LD-B-15	B-22	81.0-82.5	24.69-25.15										100
	B-23	83.0-84.0	25.30-25.60										
	B-24	90.0-91.0	27.43-27.73										
	B-25	93.5-94.5	28.50-28.80										100
	B-26	100.0-100.5	30.48-30.63										
LD-B-16	S-1	5.0-6.2	1.52-1.89										
	D-2	6.5-7.0	1.98-2.13						100	99	95	83	
	B-3	3.0-8.0	0.91-2.44							100	97	87	
	D-4	10.5-11.0	3.20-3.32										
	D-5	15.5-16.0	4.72-4.88										
	B-6	12.0-16.0	3.66-4.88										100
	D-7	20.5-21.0	6.25-6.40										
	D-8	30.5-31.0	9.30-9.45										
	D-10	40.5-41.0	12.34-12.50										
	D-11	50.5-51.0	15.39-15.54										100
	D-12	60.0-60.5	18.29-18.44										
	D-13	70.5-71.0	21.49-21.64										100
	D-14	80.5-81.0	24.54-24.69										
	D-15	90.0-90.5	27.43-27.58										
	D-16	100.1-100.6	30.51-30.66								100	99	
	LD-B-17	P-1	5.0-7.1	1.52-2.16							100	99	91
P-2		10.0-10.6	3.05-3.23										100
P-2		10.6-12.0	3.23-3.66										
P-3		15.0-16.8	4.57-5.12						100	99	94	77	
P-4		20.0-20.6	6.10-6.28										
P-4		20.6-21.2	6.28-6.46						100	99	95	80	
P-4		21.2-22.1	6.55-6.73								100	85	
P-5		30.6-31.2	9.33-9.51										100
P-6		40.0-41.8	12.19-12.74										
LD-B-18	B-1	0.0-1.0	0.00-0.30										
	B-2	1.0-3.0	0.30-0.91							100	98	91	
	D-3	5.0-5.5	1.52-1.68										
	B-4	7.0-8.0	2.13-2.44										
	D-5	10.5-11.0	3.20-3.32							100	98	86	
	B-6	14.0-15.0	4.27-4.57										
	D-7	15.5-16.0	4.72-4.88										
	B-8	17.0-18.0	5.18-5.49										

*Indicates that test has been performed and results are included in this appendix.

PERCENT FINER BY WEIGHT										ATTERBERG LIMITS			USCS	IN-SITU					COMPACTION		
SIEVE OPENING			U S STANDARD SIEVE NO.				PARTICLE SIZE (mm)							DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		
GRAVEL			SAND				SILT OR CLAY			LL	PL	PI		(pcf)	(kg/m ³)				(pcf)	(kg/m ³)	
1 1/2"	3/4"	3/8"	4	10	40	100	200	.005	.001												
				100	99	99	98	78	50	91	31	60	CH			25.7					
													SM			2.9					
													SM			4.9					
				100	91	38	13					NP	SM			1.9					
													SM			2.8					
													SC			2.1					
	100	99	95	83	36	16	12	7	5	26	16	10	SC	119.0	1906	2.7	17.7	0.41			
		100	97	87	40	23	17			31	17	14	SC								
													CH	95.7	1533	26.6	94.5	0.76			
													CL	128.7	2062	5.1	44.9	0.31			
				100	84	77	72	30	24	44	20	24	CL								
						100	99	87	70	85	26	59	CH	107.4	1720	21.3	100.0	0.57			
													CH	109.3	1751	20.6	100.0	0.54			
													CH	109.3	1751	15.9	79.5	0.54			
				100	98	96	92	79	6	64	24	40	CH	105.8	1695	21.2	94.9	0.61			
													CH	104.5	1674	19.5	86.1	0.61			
				100	99	98	97	79	55	77	28	49	CH	107.6	1724	22.5	100.0	0.57			
													CH	111.0	1778	10.4	54.3	0.52			
							100	81	1	82	28	54	CH	99.9	1600	24.3	95.6	0.69			
			100	99	72	64	49	14	9	30	24	6	SM	116.5	1866	7.6	45.8	0.45			
													SP/SM	120.3	1927	9.6	64.9	0.40			
			100	99	91	35	16	12					SM	122.2	1957	12.6	89.6	0.38			
					100	48	27	18	10	9			SW/SM	119.9	1921	10.4	69.3	0.41			
	100	99	94	77	33	15	12					NP	SW/SM	119.0	1906	11.2	72.6	0.42			
													SW/SM	122.1	1956	11.1	78.9	0.38			
	100	99	95	80	37	20	15	8	7				SM	117.3	1879	9.0	55.7	0.44			
			100	85	25	12	8					NP	SW/SM	115.8	1855	10.2	60.7	0.46			
				100	99	98	94	68	39	60	23	37	CH	111.0	1178	17.5	93.3	0.50			
													SM	102.7	1645	21.8	92.0	0.64			
				100	99	94	93	48	31				CL	100.5	1610	16.0	79.7	0.54			
							100	72	18	3	3		NP	FM	101.2	1621	16.8	68.3	0.67		
89	82	77	68	54	34	18	11	2	1				SP/SM	123.2	1973	8.8	64.9	0.37			
													SM			1.8					
			100	98	91	61	44	36	17	9	41	19	22	SC			2.3				
													SC	105.3	1687	3.6	16.4	0.60			
													SC			2.6					
			100	98	86	64	46	33	14	7	25	21	4	SM/SC	109.1	1748	6.4	30.0	0.58		
													SM/SC			5.6					
													SM/SC	110.6	1772	7.4	38.2	0.52			
													SM/SC			2.9					

Included in this appendix.

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TERBERG LIMITS		USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m³)				(pcf)	(kg/m³)								
31	60	CH			25.7												
		SM			2.9												
		SM			4.9												
	NP	SM			1.9												
		SM			2.8												
		SC			2.1												
16	10	SC	119.0	1906	2.7	17.7	0.41						*				
17	14	SC															
		CH	95.7	1533	26.6	94.5	0.76										
		CL	128.7	2062	5.1	44.9	0.31										
20	24	CL															
26	59	CH	107.4	1720	21.3	100.0	0.57								*		
		CH	109.3	1751	20.6	100.0	0.54										
		CH	109.3	1751	15.9	79.5	0.54										
24	40	CH	105.8	1695	21.2	94.9	0.61				2.73		*				
		CH	104.5	1674	19.5	86.1	0.61										
28	49	CH	107.6	1724	22.5	100.0	0.57										
		CH	111.0	1778	10.4	54.3	0.52										
28	54	CH	99.9	1600	24.3	95.6	0.69						*				
24	6	SM	116.5	1866	7.6	45.8	0.45										
		SP/SM	120.3	1927	9.6	64.9	0.40										
		SM	122.2	1957	12.6	89.6	0.38							*			
		SW/SM	119.9	1921	10.4	69.3	0.41										
	NP	SW/SM	119.0	1906	11.2	72.6	0.42										
		SW/SM	122.1	1956	11.1	78.9	0.38					*					
		SM	117.3	1879	9.0	55.7	0.44					*					
	NP	SW/SM	115.8	1855	10.2	60.7	0.46					*			*		
23	37	CH	111.0	1178	17.5	93.3	0.50				2.67		*				
		SM	102.7	1645	21.8	92.0	0.64										
		CL	100.5	1610	16.0	79.7	0.54						*				
	NP	SM	101.2	1621	16.8	68.3	0.67										
		SP/SM	123.2	1973	8.8	64.9	0.37										
		SM			1.8												
19	22	SC			2.3												
		SC	105.3	1687	3.6	16.4	0.60										
		SC			2.6												
21	4	SM/SC	109.1	1748	6.4	30.0	0.58						*				
		SM/SC			5.6												
		SM/SC	110.6	1772	7.4	38.2	0.52										
		SM/SC			2.9												

SUMMARY OF LABORATORY TEST RESULTS
PAGE 9 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
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FUGRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S S	
		FEET	METERS	BLDS.	COBBLES		GRAVEL						
				24"	12"	6"	3"	1½"	¾"	3/8"	4	10	
LD-B-18	D-9	20.5-21.0	6.25-6.40						100	97	96	84	
	B-10	22.0-23.5	6.71-7.16							100	97	87	
	B-11	27.0-28.5	8.23-8.69										
	D-12	30.5-31.0	9.30-9.45						100	99	93	84	
	B-13	32.0-33.0	9.75-10.06										
	B-14	38.0-38.5	11.58-11.73							100	99	93	
	B-15	40.0-41.0	12.19-12.50										
	B-16	47.0-48.0	14.33-14.63										
	B-17	53.0-53.5	16.15-16.30										
	B-18	55.0-56.0	16.76-17.06										
	B-19	60.0-61.0	18.29-18.59										
	B-20	63.0-64.0	19.20-19.50										
	B-21	67.0-67.5	20.42-20.57					100	93	87	81	64	
	B-22	74.0-75.0	22.56-22.86										
	B-23	78.0-79.5	23.77-24.23										
	B-24	80.0-81.0	24.38-24.69						100	98	95	87	
	B-25	82.5-83.5	25.15-25.45										
	B-26	87.0-88.0	26.52-26.82										
	B-27	89.0-90.0	27.13-27.43										
	B-28	91.5-92.0	27.89-28.04										
	B-29	92.5-93.5	28.19-28.50					100	79	75	67	51	
	B-30	96.0-96.5	29.26-29.41							100	99	93	
	B-31	100.0-101.0	30.48-30.78										
LD-C-1	P-1	5.0-5.6	1.52-1.71										
	P-1	5.6-6.2	1.71-1.89						100	98	92	71	
	P-2	15.0-15.6	4.57-4.75						100	97	85	51	
	P-2	16.0-16.8	4.88-5.12										
	P-3	21.1-21.7	6.43-6.61										
	P-4	30.6-31.2	9.33-9.51							100	96	84	
	P-4	31.2-32.0	9.51-9.75										
	P-5	40.0-41.2	12.19-12.56						100	95	84	64	
	P-6	50.0-51.1	15.24-15.58										
	P-7	60.0-61.3	18.29-18.68										
	P-8	70.0-70.3	21.34-21.43						100	82	74	64	
	P-9	80.0-80.3	24.38-24.47										
	P-10	90.0-90.6	27.43-27.61										100
	P-11	100.1-100.4	30.51-30.60										
	P-12	125.0-125.4	38.10-38.22							100	99	93	
	P-13	151.6-152.1	46.21-46.36										100
	P-14	175.0-175.4	53.34-53.46										
	P-15	200.0-201.6	60.96-61.45						100	99	88	64	
	P-16	225.0-226.2	68.58-68.95										

*Indicates that test has been performed and results are included in this appendix.

	3"	1½"	3/4"	3/8"	4	10	40	100	200	.005	.001	LL	PL	PI		(pcf)	(kg/m³)	W	U	SA	VC	RI	(pcf)
			100	97	96	86	62	44	32	8	4	25	17	8	SC	111.0	1778	12.1		63.3	0.52		
				100	97	87	51	28	24			26	18	8	SC			2.1					
												29	18	11	SC			3.5					
			100	99	93	84	57	36	25	10	7	27	20	7	SC/SM	120.2	1925	6.4		43.0	0.40		
															SC			1.9					
				100	99	93	47	19	14						SC			1.5					
															SC			2.0					
															SC			2.9					
												27	19	8	SC			3.2					
															SC			7.6					
															SP/SM			1.0					
														NP	SM			2.0					
		100	93	87	81	68	36	19	8						SP/SM			1.2					
															SP/SM			0.6					
															SP/SM			1.2					
			100	98	95	87	50	19	12						SW/SM			1.5					
															SW/SM			1.6					
															SW/SM			0.9					
															SP			0.5					
															SP			1.5					
		100	79	75	67	55	29	12	4						SP			0.5					
				100	99	97	66	28	5						SP			0.8					
															SP			1.9					
															SC/SM	119.9	1921	9.1	60.6	0.41			
			100	98	92	78	47	33	26	9	7	26	20	6	SC/SM	118.6	1900	9.3	69.3	0.36			
			100	97	85	59	24	11	8	4	2				SW/SM	112.6	1804	11.3	61.5	0.50			
															SW/SM	107.7	1725	18.1	86.6	0.56			
															SM	117.3	1879	9.3	72.0	0.35			
				100	96	82	58	28	17	5	3				SM	114.7	1837	11.0	60.9	0.50			
															SM	123.3	1975	10.2	75.2	0.37			
			100	95	84	67	38	22	14					NP	SM	125.6	2012	7.6	60.0	0.34			
															SM	119.2	1909	9.5	62.2	0.41			
															SM	124.8	1999	13.6	100.0	0.35			
			100	82	74	64	41	26	12						SM	128.1	2052	7.5	64.3	0.32			
															GM	132.6	2124	5.1	50.5	0.27			
					100	90	41	16		6	3				SM	110.5	1770	9.8	52.3	0.50			
															CH	104.8	1679	13.0	57.5	0.61			
				100	99	91	55	37	18	6	5			NP	SM	127.1	2036	9.3	77.3	0.33			
					100	91	71	43		13	8	27	18	9	SC	103.3	1655	11.7	49.8	0.64			
															SW/SM	121.4	1945	12.4	86.5	0.39			
			100	99	88	65	32	18	11						SW/SM	111.3	1783	19.6	100.0	0.51			
															SW/SM	126.9	2033	12.2	100.0	0.33			

included in this appendix.

ATTERBERG LIMITS			USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAXIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
				DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
				(pcf)	(kg/m³)				(pcf)	(kg/m³)								
5	17	8	SC	111.0	1778	12.1	63.3	0.52				2.70						
6	18	8	SC			2.1												
9	18	11	SC			3.5												
7	20	7	SC/SM	120.2	1925	6.4	43.0	0.40										
			SC			1.9												
			SC			1.5												
			SC			2.0												
			SC			2.9												
7	19	8	SC			3.2												
			SC			7.6											*	
			SP/SM			1.0												
		NP	SM			2.0												
			SP/SM			1.2												
			SP/SM			0.6												
			SP/SM			1.2												
			SW/SM			1.5												
			SW/SM			1.6												
			SW/SM			0.9												
			SP			0.5												
			SP			1.5												
			SP			0.5												
			SP			0.8												
			SP			1.9												
			SC/SM	119.9	1921	9.1	60.6	0.41							*			
26	20	6	SC/SM	118.6	1900	9.3	69.3	0.36						*				
			SW/SM	112.6	1804	11.3	61.5	0.50				2.71			*			
			SW/SM	107.7	1725	18.1	86.6	0.56										
			SM	117.3	1879	9.3	72.0	0.35						*				
			SM	114.7	1837	11.0	60.9	0.50										
			SM	123.3	1975	10.2	75.2	0.37										
		NP	SM	125.6	2012	7.6	60.0	0.34										
			SM	119.2	1909	9.5	62.2	0.41										
			SM	124.8	1999	13.6	100.0	0.35										
			SM	128.1	2052	7.5	64.3	0.32										
			GM	132.6	2124	5.1	50.5	0.27										
			SM	110.5	1770	9.8	52.3	0.50				2.65	*					
			CH	104.8	1679	13.0	57.5	0.61										
		NP	SM	127.1	2036	9.3	77.3	0.33										
27	18	9	SC	103.3	1655	11.7	49.8	0.64				2.71	*					
			SW/SM	121.4	1945	12.4	86.5	0.39										
			SW/SM	111.3	1783	19.6	100.0	0.51										
			SW/SM	126.9	2033	12.2	100.0	0.33										

SUMMARY OF LABORATORY TEST RESULTS
PAGE 10 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
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FUGRO NATIONAL, INC.

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APPROVED BY _____
CHECKED BY _____

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S STA	
				BLDRS.	COBBLES		GRAVEL				SI		
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	
LD-C-1	P-17	252.0-252.3	76.81-76.90						100	98	81	52	
LD-C-2	P-1	5.0-5.6	1.52-1.71										
	P-1	6.2-6.9	1.89-2.10							100	98	79	
	P-2	10.6-11.2	3.23-3.38										
	P-3	15.0-15.6	4.57-4.75										
	P-3	15.6-16.2	4.75-4.94						100	96	92	76	
	P-3	16.2-17.1	4.94-5.21										
	P-4	20.6-21.2	6.28-6.46										
	P-5	30.0-30.6	9.14-9.33							100	97	85	
	P-5	30.6-31.2	9.33-9.51										
	P-6	40.0-42.0	12.19-12.80										
	P-7	50.0-50.6	15.24-15.42										
	P-7	51.8-52.1	15.79-15.88										
	P-8	60.0-62.0	18.29-18.90										
	P-9	70.0-72.4	21.34-22.07										
	P-10	80.0-80.6	24.38-24.57										
	P-10	80.6-81.2	24.57-24.75										
	P-10	81.6-82.2	24.87-25.05										
	P-11	90.0-91.5	27.43-27.89										
	P-12	100.0-100.5	30.48-30.63										
	P-13	125.0-126.8	38.10-38.65										
	P-14	150.0-151.4	45.72-46.15									100	
	P-15	175.0-175.6	53.34-53.52										
	P-15	175.6-176.2	53.52-53.71										
	P-15	176.2-176.7	53.71-53.86										
	P-16	200.0-200.5	60.96-61.11										
	P-17	225.0-226.5	68.58-69.04										
	P-18	250.0-250.6	76.20-76.38										
	P-18	250.6-251.2	76.38-76.57										
	P-19	275.0-276.8	83.82-84.37									100	
	P-20	300.0-300.6	91.44-91.62										
LD-C-3	P-1	5.0-5.6	1.52-1.71								100	94	
	P-1	5.6-7.3	1.71-2.23										
	P-2	10.0-10.6	3.05-3.23								100	95	
	P-2	11.8-12.0	3.60-3.66						100	97	90	77	
	P-3	15.6-16.2	4.75-4.94										
	P-3	16.2-17.4	4.94-5.30										
	P-4	20.0-20.6	6.10-6.28										
	P-4	21.0-22.0	6.40-6.70							100	99	86	
	P-5	30.0-30.6	9.14-9.33									100	
	P-5	31.2-31.8	9.51-9.69										

*Indicates that test has been performed and results are included in this appendix.

PERCENT FINER BY WEIGHT												ATTERBERG LIMITS			USCS	IN-SITU					MA DRY	
STANDARD SIEVE OPENING					U S STANDARD SIEVE NO.					PARTICLE SIZE (mm)						DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO		(pcf)
GRAVEL					SAND			SILT OR CLAY								(pcf)	(kg/m ³)					
3"	3"	1½"	3/4"	3/8"	4	10	40	100	200	.005	.001	LL	PL	PI								
			100	98	81	52	24	13	9						SW/SM		6.7					
															SM	116.9	1873	12.0	73.1	0.44		
				100	98	79	39	21	17					NP	SM	118.7	1901	10.2	65.7	0.42		
															SM	117.1	1876	13.0	80.2	0.44		
															SM	108.4	1736	16.0	78.2	0.55		
			100	96	92	76	39	19	12	2	1			NP	SM	116.8	1871	11.9	72.9	0.44		
															SM	120.9	1935	9.6	66.1	0.39		
												36	18	18	SC	111.1	1780	11.8	61.7	0.52		
			100	97	85	40	17	11	4	3					SP/SM	112.7	1805	15.5	82.1	0.52		
															SM	121.6	1948	10.6	74.5	0.39		
															SM	114.0	1826	16.7	94.5	0.48		
															CH	104.5	1674	20.8	78.9	0.71		
									100	56	48	56	23	33	CH	99.9	1600	20.1	78.9	0.69		
							100	98	63	8	5			NP	ML	95.8	1535	22.9	81.3	0.76		
															CH	117.9	1889	15.3	73.7	0.56		
															SM	97.2	1557	15.0	55.2	0.73		
							100	87	22	8	5				SM	96.0	1538	12.1	43.3	0.76		
															SM	101.2	1621	18.5	75.1	0.66		
							100	49	8						SP/SM	99.1	1587	18.7	72.1	0.70		
							100	92	62	8	5			NP	ML	94.5	1514	12.7	43.7	0.78		
															CH	105.5	1690	22.3	100.0	0.60		
						100	98	97	97	72	47	71	26	45	CH	93.5	1498	28.1	94.6	0.80		
															CH	111.5	1786	12.6	100.0	0.34		
									100	83	57	83	28	55	CH	99.7	1597	25.5	99.8	0.69		
															CH	96.1	1539	27.7	99.1	0.75		
															SM	99.4	1592	19.0	73.7	0.70		
															CH	90.8	1454	33.8	100.0	0.86		
												27	17	10	CL	102.0	1634	24.3	100.0	0.66		
															CL	99.3	1591	27.4	100.0	0.70		
						100	96	48	18						SM	115.8	1855	14.9	88.5	0.46		
															CH	97.7	1565	29.5	100.0	0.72		
															SC	112.3	1799	13.1	70.7	0.50		
						100	94	64	48	40	13				SC	114.5	1834	8.8	50.3	0.47		
															SM	106.4	1704	14.7	67.9	0.58		
			100	97	90	77	41	21	15	4	3			NP	SM	118.0	1890	12.0	75.5	0.43		
												33	21	12	SC	114.6	1836	9.8	68.2	0.39		
															SC	118.5	1898	9.3	59.5	0.42		
															SM	109.3	1751	13.3	66.8	0.54		
				100	99	86	46	29	23					NP	SM	110.3	1767	13.8	70.8	0.53		
						100	70	45	35	12	7				SM	105.3	1687	10.8	48.6	0.60		
															SM	99.9	1600	18.7	73.5	0.69		

are included in this appendix.

	USCS	IN-SITU					COMPACTED		SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	C99	
		DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY									OPTIMUM MOISTURE (%)
		(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
	SW/SM			6.7												
	SM	116.9	1873	12.0	73.1	0.44						*				
NP	SM	118.7	1901	10.2	65.7	0.42						*				
	SM	117.1	1876	13.0	80.2	0.44										
	SM	108.4	1736	16.0	78.2	0.55					*					
NP	SM	116.8	1871	11.9	72.9	0.44										
	SM	120.9	1935	9.6	66.1	0.39										
18	SC	111.1	1780	11.8	61.7	0.52							*			
	SP/SM	112.7	1805	15.5	82.1	0.52			2.74							
	SM	121.6	1948	10.6	74.5	0.39										
	SM	114.0	1826	16.7	94.5	0.48										
	CH	104.5	1674	20.8	78.9	0.71					*					
33	CH	99.9	1600	20.1	78.9	0.69										
NP	ML	95.8	1535	22.9	81.3	0.76										
	CH	117.9	1889	15.3	73.7	0.56										
	SM	97.2	1557	15.0	55.2	0.73				*						
	SM	96.0	1538	12.1	43.3	0.76				*						
	SM	101.2	1621	18.5	75.1	0.66				*						
	SP/SM	99.1	1587	18.7	72.1	0.70										
NP	ML	94.5	1514	12.7	43.7	0.78										
	CH	105.5	1690	22.3	100.0	0.60										
45	CH	93.5	1498	28.1	94.6	0.80										
	CH	111.5	1786	12.6	100.0	0.34					*					
55	CH	99.7	1597	25.5	99.8	0.69				*						
	CH	96.1	1539	27.7	99.1	0.75										
	SM	99.4	1592	19.0	73.7	0.70										
	CH	90.8	1454	33.8	100.0	0.86										
10	CL	102.0	1634	24.3	100.0	0.66					*					
	CL	99.3	1591	27.4	100.0	0.70										
	SM	115.8	1855	14.9	88.5	0.46										
	CH	97.7	1565	29.5	100.0	0.72										
	SC	112.3	1799	13.1	70.7	0.50						*				
	SC	114.5	1834	8.8	50.3	0.47										
	SM	106.4	1704	14.7	67.9	0.58										
NP	SM	118.0	1890	12.0	75.5	0.43										
12	SC	114.6	1836	9.8	68.2	0.39					*			*		
	SC	118.5	1898	9.3	59.5	0.42										
	SM	109.3	1751	13.3	66.8	0.54			2.69		*					
NP	SM	110.3	1767	13.8	70.8	0.53										
	SM	105.3	1687	10.8	48.6	0.60				*						
	SM	99.9	1600	18.7	73.5	0.69							*			

SUMMARY OF LABORATORY TEST RESULTS
PAGE 11 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
C-2

FUGRO NATIONAL, INC.

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APPROVED BY

CHECKED BY

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT								
				STANDARD SIEVE OPENING								
		FEET	METERS	BLORS	COBBLES		GRAVEL					4
24"	12"			6"	3"	1½"	3/4"	3/8"				
LD-C-3	P-6	40.0-40.8	12.19-12.44									
	P-7	50.0-52.2	15.24-15.91									
	P-8	60.0-62.3	18.29-18.99									100
	P-9	70.0-72.1	21.34-21.98									
	P-10	80.0-80.6	24.38-24.57									100
	P-11	90.0-90.6	27.43-27.61								100	99
	P-12	100.0-100.8	30.48-30.72								100	99
	P-13	125.0-126.0	38.10-38.40									
	P-14	150.0-150.6	45.72-45.90									
	P-14	151.2-151.8	46.09-46.27									
	P-15	175.0-175.4	53.34-53.46									100
	F-16	200.0-200.4	60.95-61.08								100	96
	P-17	225.0-225.3	68.58-68.67								100	99
	P-18	250.2-250.6	76.26-76.38									
	P-18	251.0-251.6	76.50-76.69									
	P-19	275.0-275.6	83.82-84.00									
	P-20	200.0-300.6	91.44-91.62									
	P-20	300.6-301.3	91.62-91.84									
LD-C-4	P-1	5.0-5.6	1.52-1.71								100	98
	P-1	5.6-6.6	1.71-2.01									
	P-2	10.0-10.6	3.05-3.23									
	P-2	10.6-11.2	3.23-3.41								100	95
	P-3	15.0-15.6	4.57-4.75									
	P-3	15.6-16.1	4.75-4.91									
	P-4	20.0-20.6	6.10-6.28					100	99	98	94	
	P-5	30.6-31.2	9.33-9.51							100	95	
	P-6	40.0-41.8	12.19-12.74									
	P-7	50.0-51.7	15.24-15.91									
	P-8	60.0-60.6	18.29-18.47									100
	P-9	70.0-70.6	21.34-21.52						100	99	94	
	P-9	70.6-71.5	21.52-21.79									
	P-10	80.0-80.6	24.38-24.57									100
	P-11	90.0-90.6	27.43-27.61								100	99
	P-12	100.0-100.7	30.48-30.69									
	P-13	125.0-125.6	38.10-38.28								100	96
	P-14	150.0-151.0	45.72-46.33						100	97	89	
	P-15	175.0-175.4	53.34-53.46									
	P-16	200.0-200.4	60.96-61.08								100	98
	P-17	250.0-250.5	76.20-76.35								100	98
	P-18	275.0-275.2	83.82-83.88								100	99
	P-19	300.0-300.2	91.44-91.50									

*Indicates that test has been performed and results are included in this appendix

PERCENT FINER BY WEIGHT												ATTERBERG LIMITS			USCS	IN-SITU					DRY UNIT WEIGHT (pcf)
STANDARD SIEVE OPENING					U S STANDARD SIEVE NO.				PARTICLE SIZE (mm)		DRY UNIT WEIGHT					MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO			
NO.	GRAVEL					SAND				SILT OR CLAY		LL	PL	PI					(pcf)	(kg/m³)	
6"	3"	1½"	3/4"	3/8"	4	10	40	100	200	.005	.001										
															SC	106.3	1703	16.0	74.0	0.59	
															SM	110.9	1776	11.2	58.3	0.52	
					100	92	58	38	29	4	2			NP	SM	111.0	1778	13.2	68.6	0.52	
															SM	113.0	1810	13.6	75.0	0.49	
					100	93	66	50	38	12	7				SC	114.6	1836	11.4	81.7	0.38	
				100	99	91	69	49	39	11	5				SC	109.7	1757	12.6	63.5	0.54	
				100	99	96	54	25	16					NP	SM	118.7	1901	11.0	71.0	0.42	
															SM	121.1	1940	9.8	67.7	0.39	
															CL	104.7	1677	11.5	51.0	0.61	
							100	97	91	25	12	34	18	16	CL	110.4	1768	14.2	75.0	0.80	
					100	96	70	53	41	4	2			NP	SM	111.1	1780	17.5	91.4	0.52	
				100	96	84	48	31	21	1	0				SM	123.4	1977	7.4	54.7	0.37	
				100	99	94	63	41	27	3	0	29	23	6	SM	129.2	2070	3.6	31.9	0.30	
					100	99	98	90	34	19		46	21	25	CL	116.1	1860	15.8	94.3	0.45	
															CL	106.1	1700	18.1	83.1	0.59	
												36	22	14	CL	109.4	1752	15.5	77.4	0.54	
												70	22	48	CH	112.7	1805	17.2	100.0	0.46	
															CH	106.9	1712	21.0	98.4	0.58	
				100	98	90	52	36	27	13	8				SC	118.0	1890	9.2	71.1	0.35	
															SC	124.9	2001	8.6	66.8	0.35	
															SC	119.0	1906	12.9	88.0	0.39	
				100	95	79	36	22	17	8	6	38	19	19	SC	121.5	1946	9.9	69.0	0.39	
															SC	118.3	1895	11.4	75.9	0.40	
															SC						
		100	99	98	94	79	34	24	16	6	4				SC	120.9	1937	8.4	57.6	0.39	
				100	95	73	40	32	25	10	7	33	19	14	SC	116.8	1871	9.1	55.5	0.44	
															SC	121.5	1946	6.2	43.6	0.39	
															SC	118.4	1897	11.7	75.0	0.42	
					100	98	84	75	59	18	10	35	22	13	CL	107.3	1719	14.6	69.3	0.57	
				100	99	94	69	35	21	16	4	3			SC	120.1	1924	11.8	79.1	0.40	
															SC	126.8	2031	8.3	68.4	0.33	
					100	99	88	80	65	12	8	33	24	9	ML	112.9	1808	12.4	68.3	0.40	
				100	99	90	69	55	47	15	10				SC	115.7	1853	10.7	75.0	0.39	
															SC	111.6	1788	15.7	83.2	0.51	
				100	96	78	44	27	20	4	2			NP	SM	118.2	1893	11.7	77.7	0.40	
				100	97	89	70	33	20	13				NP	SM	116.0	1858	9.7	57.9	0.45	
												31	22	9	CL	115.3	1847	10.0	58.5	0.46	
				100	98	91	65	54	41	8	2			NP	SM	117.8	1887	11.7	73.5	0.43	
				100	98	87	46	32	19						SM	117.9	1889	12.1	76.3	0.43	
				100	99	92	71	58	40	11	7	31	24	7	SM			12.5			
														NP	SM			14.6			

are included in this appendix.

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TERBERG UNITS		USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
		SC	106.3	1703	16.0	74.0	0.59										
		SM	110.9	1776	11.2	58.3	0.52										
	NP	SM	111.0	1778	13.2	68.6	0.52										
		SM	113.0	1810	13.6	75.0	0.49										
		SC	114.6	1836	11.4	81.7	0.38										
		SC	109.7	1757	12.6	63.5	0.54					*	*				
	NP	SM	118.7	1901	11.0	71.0	0.42										
		SM	121.1	1940	9.8	67.7	0.39										
		CL	104.7	1677	11.5	51.0	0.61					*					
18	16	CL	110.4	1768	14.2	75.0	0.80				2.66						
	NP	SM	111.1	1780	17.5	91.4	0.52										
		SM	123.4	1977	7.4	54.7	0.37										
23	6	SM	129.2	2070	3.6	31.9	0.30										
21	25	CL	116.1	1860	15.8	94.3	0.45										
		CL	106.1	1700	18.1	83.1	0.59					*					
22	14	CL	109.4	1752	15.5	77.4	0.54										
22	48	CH	112.7	1805	17.2	100.0	0.46						*				
		CH	106.9	1712	21.0	98.4	0.58										
		SC	118.0	1890	9.2	71.1	0.35						*				
		SC	124.9	2001	8.6	66.8	0.35										
		SC	119.0	1906	12.9	88.0	0.39							*			
19	19	SC	121.5	1946	9.9	69.0	0.39										
		SC	118.3	1895	11.4	75.9	0.40				2.66						
		SC															
		SC	120.9	1937	8.4	57.6	0.39					*					
19	14	SC	116.8	1871	9.1	55.5	0.44								*		
		SC	121.5	1946	6.2	43.6	0.39				2.70						
		SC	118.4	1897	11.7	75.0	0.42										
22	13	CL	107.3	1719	14.6	69.3	0.57										
		SC	120.1	1924	11.8	79.1	0.40					*					
		SC	126.8	2031	8.3	68.4	0.33										
24	9	ML	112.9	1808	12.4	68.3	0.40										
		SC	115.7	1853	10.7	75.0	0.39						*				
		SC	111.6	1788	15.7	83.2	0.51										
	NP	SM	118.2	1893	11.7	77.7	0.40										
	NP	SM	116.0	1858	9.7	57.9	0.45										
22	9	CL	115.3	1847	10.0	58.5	0.46										
	NP	SM	117.8	1887	11.7	73.5	0.43										
		SM	117.9	1889	12.1	76.3	0.43										
24	7	SM			12.5												
	NP	SM			14.6												

SUMMARY OF LABORATORY TEST RESULTS
PAGE 12 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
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FUGRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S STAN	
				BLDRS.	COBBLES		GRAVEL					SA	
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	
LD-C-5	P-1	6.2-6.8	1.89-2.07							100	97	78	
	P-2	10.0-10.9	3.05-3.32										
	P-3	15.0-15.6	4.57-4.75								100	94	
	P-4	20.0-20.6	6.10-6.28									100	
	P-4	20.6-20.9	6.28-6.37										
	P-4	20.9-21.5	6.37-6.55										
	P-5	30.0-30.9	9.14-9.42										
	P-6	40.0-40.6	12.19-12.38							100	98	90	
	P-6	40.6-41.7	12.38-12.71										
	P-7	50.0-50.8	15.24-15.48						100	99	94	77	
	P-8	60.6-61.2	18.47-18.65							100	99	92	
	P-9	70.0-71.8	21.34-21.88						100	99	94	78	
	P-10	80.0-80.6	24.38-24.57					100	92	89	83	72	
	P-10	81.0-82.0	24.69-24.99										
	P-11	90.0-91.1	27.43-27.77										
	P-12	100.0-101.2	30.48-30.85										
	P-13	125.0-125.5	38.10-38.25						100	88	74	53	
	P-14	150.0-150.4	45.72-45.84										
	P-15	175.0-175.8	53.34-53.58					100	89	76	63	50	
	P-16	200.0-200.6	60.96-61.14						100	97	89	70	
	P-17	225.0-225.3	68.58-68.67						100	91	82	71	
LD-C-6	P-1	5.0-7.0	1.52-2.14										
	P-2	10.0-10.6	3.05-3.23									100	
	P-2	10.6-11.2	3.23-3.41										
	P-2	11.2-11.8	3.41-3.60										
	P-3	20.0-20.2	6.10-6.16							100	97	92	
	P-4	30.0-30.6	9.14-9.33								100	99	
	P-5	40.0-42.0	12.19-12.80										
	P-6	50.0-51.4	15.24-15.48										
	P-7	60.0-61.4	18.29-18.71										
	P-8	70.0-70.6	21.34-21.52										
	P-9	80.0-80.6	24.38-24.57										
	P-9	80.6-81.6	24.57-24.87										
	P-10	90.0-90.6	27.43-27.61									100	
	P-11	100.0-100.7	30.48-30.69										
	P-12	125.0-125.6	38.10-38.28									100	
	P-12	125.6-126.5	38.28-38.56										
	P-13	150.0-151.9	45.72-46.30									100	
	P-14	175.0-175.2	53.34-53.40									100	
LD-D-1	P-1	5.0-5.6	1.52-1.71										
	P-1	5.6-6.2	1.71-1.89										

*Indicates that test has been performed and results are included in this appendix.

	100	99	94	77	48	37	31	12	7	36	19	17	SC	118.2	1893	10.3	65.2	0.43
		100	99	92	64	48	36	12	7	29	18	11	SC	115.0	1842	8.7	66.3	0.35
	100	99	94	73	35	20	13					NP	SM	116.5	1866	11.8	71.6	0.45
00	92	89	83	72	49	33	30	72	6				SC	113.5	1818	12.7	70.8	0.48
													SC	113.6	1820	13.2	73.5	0.48
													SC	122.4	1961	7.4	53.2	0.38
													SC	120.8	1935	13.0	88.5	0.40
	100	88	74	53	23	14	10	3	2				SW/SM	122.8	1967	9.3	67.2	0.37
													SM	111.7	1789	9.6	51.0	0.51
00	89	76	63	50	24	11	7					NP	SP/SM	125.8	2015	7.8	62.2	0.34
	100	97	89	70	40	25	17	4	2				SM	121.1	1940	8.8	60.7	0.39
	100	91	82	71	45	26	15	4	2			NP	SM			8.1		
													SM/SC	114.7	1837	11.5	66.1	0.47
													SM/SC	115.7	1853	7.5	44.2	0.46
													SM/SC	114.4	1833	8.5	51.5	0.45
													SM/SC	112.9	1808	9.4	51.5	0.49
	100	97	92	42	12	6							SP/SM			10.9		
		100	99	89	77	27	7	6				NP	SM	96.6	1547	17.4	63.1	0.74
													SM	105.1	1684	10.6	47.3	0.60
													SM	104.1	1668	16.1	70.4	0.62
					100	81	37	9	6			NP	SM	99.7	1597	22.0	86.1	0.69
													SM	108.7	1741	16.4	80.7	0.55
													CH	103.8	1663	22.7	100.0	0.61
						100	99	93	62	69	25	44	CH	102.9	1648	24.0	100.0	0.64
				100	98	87	27	4	2				SM	102.0	1639	13.5	55.9	0.65
													SM	115.1	1844	12.9	75.1	0.46
				100	99	92	56	11	6			NP	ML	99.6	1595	13.0	50.8	0.69
													ML	109.8	1759	14.1	71.2	0.53
				100	99	83	32					NP	SM	107.8	1727	16.2	77.7	0.56
				100	98	57	19	10	0				SM			14.2		
													SC	107.6	1724	8.3	39.5	0.57
													SC	119.0	1906	5.5	35.0	0.42

and in this appendix.

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TEST NO.	USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
		DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
		(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
26	SC	118.1	1892	8.7	51.0	0.46						*				
	SC	115.0	1842	10.5	63.0	0.44				2.66						
20	SC	115.1	1844	13.2	76.8	0.46							*			
14	CL	104.4	1672	16.0	57.6	0.75								*		
	CL	109.4	1752	15.5	77.5	0.54										
	CL	114.3	1831	10.1	57.6	0.47										
	CL	112.2	1797	12.0	64.5	0.50										
14	SC	110.6	1772	13.9	80.6	0.47						*				
	SC	117.5	1882	12.9	80.6	0.43										
17	SC	118.2	1893	10.3	65.2	0.43										
11	SC	115.0	1842	8.7	66.3	0.35						*				
NP	SM	116.5	1866	11.8	71.6	0.45										
	SC	113.5	1818	12.7	70.8	0.48					*					
	SC	113.6	1820	13.2	73.5	0.48										
	SC	122.4	1961	7.4	53.2	0.38										
	SC	120.8	1935	13.0	88.5	0.40										
	SW/SM	122.8	1967	9.3	67.2	0.37										
	SM	111.7	1789	9.6	51.0	0.51										
NP	SP/SM	125.8	2015	7.8	62.2	0.34										
	SM	121.1	1940	8.8	60.7	0.39					*					
NP	SM			8.1												
	SM/SC	114.7	1837	11.5	66.1	0.47										
4	SM/SC	115.7	1853	7.5	44.2	0.46							*			
	SM/SC	114.4	1833	8.5	51.5	0.45						*				
	SM/SC	112.9	1808	9.4	51.5	0.49										
	SP/SM			10.9												
NP	SM	96.6	1547	17.4	63.1	0.74					*					
	SM	105.1	1684	10.6	47.3	0.60										
	SM	104.1	1668	16.1	70.4	0.62										
NP	SM	99.7	1597	22.0	86.1	0.69										
	SM	108.7	1741	16.4	80.7	0.55							*			
	CH	103.8	1663	22.7	100.0	0.61										
44	CH	102.9	1648	24.0	100.0	0.64										
	SM	102.0	1539	13.5	55.9	0.65					*					
	SM	115.1	1844	12.9	75.1	0.46										
NP	ML	99.6	1595	13.0	50.8	0.69					*					
	ML	109.8	1759	14.1	71.2	0.53										
NP	SM	107.8	1727	16.2	77.7	0.56										
	SM			14.2												
	SC	107.6	1724	8.3	39.5	0.57							*			
	SC	119.0	1906	5.5	35.0	0.42						*				

SUMMARY OF LABORATORY TEST RESULTS
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MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
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FUGRO NATIONAL, INC.

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BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING							U S STAND		
				BLDRS.	COBBLES		GRAVEL				SAND		
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	
LD-D-1	P-1	6.6-7.3	2.01-2.23						100	98	91	73	
	P-2	10.0-11.0	3.05-3.35										
	P-3	15.0-17.3	4.57-5.27							100	93	75	
	P-4	20.0-20.6	6.10-6.28										
	P-4	20.6-21.2	6.28-6.46										
	P-4	21.2-21.6	6.46-6.58										
	P-4	21.6-22.5	6.58-6.86						100	98	95	86	
	P-5	30.0-31.2	9.14-9.51										
	P-6	40.0-41.6	12.19-12.68						100	98	93	85	
	P-7	50.0-51.2	15.24-15.61										
	P-8	60.1-60.7	18.32-18.50								100	95	
	P-8	60.7-61.3	18.50-18.68										
	P-8	61.3-62.2	18.68-18.96										
	P-9	70.0-71.9	21.34-21.91						100	99	67	43	
	P-10	80.0-80.9	24.38-24.66										
	P-11	90.0-90.6	27.43-27.61									100	
	P-11	91.0-91.7	27.74-27.95										
	P-12	100.0-101.6	30.48-30.97						100	99	98	92	
	P-13	125.0-125.5	38.10-38.25										
	P-14	150.0-150.6	45.72-45.90									100	
	P-15	175.0-175.6	53.34-53.52							100	98	85	
	P-16	200.0-201.0	60.96-61.26										
	P-17	226.6-227.5	69.07-69.25									100	
	P-18	250.0-250.6	76.20-76.38									100	
	P-18	251.6-252.5	76.69-76.96										
	P-19	275.0-275.6	83.82-84.00									100	
	P-19	276.6-277.5	84.31-84.58									100	
	P-20	301.1-302.0	91.78-92.05									100	
	P-21	350.0-351.5	106.68-107.14									100	
	P-22	400.1-401.1	121.95-122.13										
	P-23	450.0-450.8	137.16-137.40									100	
	P-24	500.0-500.4	152.40-152.52										
	P-25	600.0-600.8	182.88-183.12										
	P-26	700.0-701.0	213.36-213.66										
LD-D-2	P-1	10.6-11.2	3.23-3.41							100	99	92	
	P-2	15.0-17.1	4.57-5.21										
	P-3	20.2-20.6	6.19-6.28						100	97	92	74	
	P-3	21.2-21.5	6.46-6.55										
	P-4	30.0-32.0	9.14-9.75										
	P-5	40.0-40.6	12.19-12.68								100	96	
	P-5	41.5-42.5	12.65-12.95										
	P-6	50.0-52.1	15.24-15.88							100	97	88	

*Indicates that test has been performed and results are included in this appendix.

PERCENT FINER BY WEIGHT										ATTERBERG LIMITS			USCS	IN-SITU				COMPACTION		
SIEVE OPENING			U S STANDARD SIEVE NO.				PARTICLE SIZE (mm)							DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY	
GRAVEL			SAND				SILT OR CLAY			(pcf)	(kg/m³)					(pcf)	(kg/m³)			
1½"	3/4"	3/8"	4	10	40	100	200	.005	.001	LL	PL	PI								
	100	98	91	73	40	29	23	12	8	44	19	25	SC	120.9	1937	5.1	35.0	0.39		
													SM	111.9	1792	7.8	41.7	0.51		
		100	93	75	35	22	17						SC	119.2	1909	7.0	45.8	0.41		
													SC	110.6	1771	4.7	25.0	0.50		
													SC							
	100	98	95	86	53	41	31	8	6	42	25	17	SC	115.7	1853	5.4	31.8	0.46		
													SM	116.2	1861	5.8	34.8	0.45		
	100	98	93	85	53	43	32						SM	114.0	1826	4.7	26.4	0.48		
													SM	118.4	1897	5.8	37.3	0.42		
			100	95	78	67	49	12	7	37	20	17	SC	103.5	1658	6.7	28.8	0.63		
													SC	105.2	1685	6.2	27.8	0.60		
													SM	107.6	1724	3.7	17.7	0.57		
	100	99	67	43	21	12	8	2	1			NP	SW/SM	117.6	1884	4.9	30.6	0.43		
													SM	110.4	1768	8.6	44.2	0.53		
				100	92	84	64	11	5	28	18	10	CL	101.9	1632	6.6	27.3	0.65		
													CL	106.5	1706	8.4	39.0	0.58		
	100	99	98	92	66	48	30	4	3				SM	113.1	1812	4.1	22.6	0.49		
													SM	111.5	1786	11.8	62.1	0.51		
				100	93	85	63	13	6	29	19	10	CL	103.5	1658	5.7	24.5	0.63		
		100	98	85	25	11	6						SW/SM	109.2	1749	8.9	44.3	0.54		
													SM	111.4	1784	15.3	80.4	0.51		
				100	87	59	24	2	1				SM	104.8	1679	17.5	77.8	0.61		
				100	94	72	31	7	4			NP	SM	101.8	1631	13.9	59.0	0.62		
													SM	99.3	1591	21.2	82.1	0.70		
				100	98	90	36	4	4			NP	SM	98.6	1579	17.0	64.8	0.71		
				100	98	92	79						ML	100.9	1616	23.7	95.4	0.67		
				100	96	87	50	8	5				ML	101.4	1624	20.4	83.4	0.66		
				100	99	95	65	20	14			NP	ML	98.5	1578	26.3	100.0	0.71		
													ML	110.3	1767	13.6	69.6	0.53		
				100	98	95	84	25	10	36	20	16	CL	111.0	1778	16.2	84.5	0.52		
													SM	104.4	1672	19.6	86.1	0.62		
					100	99	93	43	8	52	22	30	CH	108.7	1741	20.1	98.9	0.55		
										52	24	29	CH	110.6	1772	20.3	100.0	0.52		
		100	99	92	58	36	28	7	5			NP	SM	117.7	1885	8.8	59.9	0.40		
													SM	112.1	1796	13.1	70.6	0.50		
	100	97	92	74	28	10	6						SW/SM	114.1	1828	12.2	69.7	0.47		
													SM	105.4	1688	9.0	40.6	0.60		
												NP	SM	114.3	1831	9.3	52.8	0.47		
			100	96	76	52	31	6	4				SM	104.7	1677	13.5	72.5	0.50		
													SM	112.2	1797	14.0	75.6	0.50		
		100	97	88	52	33	22					NP	SM	117.0	1874	11.5	70.5	0.44		

cluded in this appendix.

TERBERG LIMITS		USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
19	25	SC	120.9	1937	5.1	35.0	0.39										
		SM	111.9	1792	7.8	41.7	0.51										
		SC	119.2	1909	7.0	45.8	0.41										
		SC	110.6	1771	4.7	25.0	0.50				2.66		*				
		SC														*	
25	17	SC	115.7	1853	5.4	31.8	0.46										
		SM	116.2	1861	5.8	34.8	0.45										
		SM	114.0	1826	4.7	26.4	0.48										
		SM	118.4	1897	5.8	37.3	0.42										
20	17	SC	103.5	1658	6.7	28.8	0.63					*					
		SC	105.2	1685	6.2	27.8	0.60					*					
		SM	107.6	1724	3.7	17.7	0.57										
	NP	SW/SM	117.6	1884	4.9	30.6	0.43										
		SM	110.4	1768	8.6	44.2	0.53										
18	10	CL	101.9	1632	6.6	27.3	0.65					*					
		CL	106.5	1706	8.4	39.0	0.58										
		SM	113.1	1812	4.1	22.6	0.49										
		SM	111.5	1786	11.8	62.1	0.51										
19	10	CL	103.5	1658	5.7	24.5	0.63					*					
		SW/SM	109.2	1749	8.9	44.3	0.54										
		SM	111.4	1784	15.3	80.4	0.51										
		SM	104.8	1679	17.5	77.8	0.61										
	NP	SM	101.8	1631	13.9	59.0	0.62				2.65		*				
		SM	99.3	1591	21.2	82.1	0.70										
	NP	SM	98.6	1579	17.0	64.8	0.71					*					
		ML	100.9	1616	23.7	95.4	0.67										
		ML	101.4	1624	20.4	83.4	0.66										
	NP	ML	98.5	1578	26.3	100.0	0.71										
		ML	110.3	1767	13.6	69.6	0.53										
20	16	CL	111.0	1778	16.2	84.5	0.52					*					
		SM	104.4	1672	19.6	86.1	0.62										
22	30	CH	108.7	1741	20.1	98.9	0.55										
24	29	CH	110.6	1772	20.3	100.0	0.52										
	NP	SM	117.7	1885	8.8	59.9	0.40						*				
		SM	112.1	1796	13.1	70.6	0.50										
		SW/SM	114.1	1828	12.2	69.7	0.47				2.69			*		*	
		SM	105.4	1688	9.0	40.6	0.60										
	NP	SM	114.3	1831	9.3	52.8	0.47										
		SM	104.7	1677	13.5	72.5	0.50						*				
		SM	112.2	1797	14.0	75.6	0.50										
	NP	SM	117.0	1874	11.5	70.5	0.44										

SUMMARY OF LABORATORY TEST RESULTS
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LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
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FUGRO NATIONAL, INC.

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BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S STAM	
				BLDRS	COBBLES		GRAVEL					SAI	
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	
LD-D-2	P-7	60.0-60.6	18.29-18.47							100	99	97	
	P-7	61.2-62.1	18.65-18.93										
	P-8	70.0-71.3	21.34-21.73										
	P-9	80.0-82.1	24.38-25.02							100	97	83	
	P-10	90.0-92.3	27.43-28.13										
	P-11	100.0-101.4	30.48-30.91						100	93	85	69	
	P-12	125.0-125.6	38.10-38.28										
	P-12	125.6-126.2	38.28-38.47							100	99	96	
	P-12	126.2-127.4	38.47-38.83										
	P-13	150.0-152.0	45.72-46.33										
	P-14	175.0-175.6	53.34-53.52										
	P-14	175.6-176.7	53.52-53.86									100	
	P-15	200.0-200.6	60.96-61.14									100	
	P-15	200.0-202.5	61.14-61.72										
	P-16	225.0-227.2	68.58-69.25						100	97	86	69	
	P-17	249.0-250.3	75.90-76.29										
	P-18	275.0-275.6	83.82-84.00									100	
	P-18	276.5-277.4	84.28-84.55										
	P-19	300.6-301.5	91.62-91.90					100	96	87	71	55	
	P-20	350.0-350.7	106.68-106.89										
	P-21	400.0-400.4	121.92-122.04										
LD-D-3	P-1	5.9-6.5	1.80-1.98						100	96	87	71	
	P-2	10.0-10.6	3.05-3.23							100	99	95	
	P-2	11.5-12.4	3.50-3.78										
	P-3	15.0-16.9	4.57-5.15										
	P-4	20.0-20.6	6.10-6.28										
	P-4	21.5-22.1	6.55-6.74						100	98	94	82	
	P-5	30.0-30.6	9.14-9.33							100	97	84	
	P-5	30.6-31.5	9.33-9.60							100	87	70	
	P-6	40.0-41.6	12.19-12.68										
	P-7	50.0-50.6	15.24-15.42						100	99	95	75	
	P-7	50.6-51.5	15.42-15.70										
	P-8	60.0-60.5	18.29-18.47										
	P-8	60.6-61.2	18.47-18.65							100	87	70	
	P-8	61.6-62.2	18.78-18.96										
	P-9	70.0-71.0	21.34-21.64										
	P-10	80.0-81.7	24.38-24.90										
	P-11	90.0-91.7	27.43-27.95						100	86	77	65	
	P-12	100.0-100.6	30.48-30.66					100	98	92	77	60	
	P-13	125.0-126.8	38.10-38.65										
	P-14	150.0-151.4	45.72-46.33										
	P-15	175.0-175.6	53.34-53.52										

*Indicates that test has been performed and results are included in this appendix.

PERCENT FINER BY WEIGHT											ATTERBERG LIMITS			USCS	IN-SITU					CON	
SIEVE OPENING				U S STANDARD SIEVE NO.				PARTICLE SIZE (mm)							DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY	
GRAVEL				SAND				SILT OR CLAY							(pcf)	(kg/m³)				(pcf)	(kg/m³)
3"	1½"	3/4"	3/8"	4	10	40	100	200	.005	.001	LL	PL	PI								
			100	99	97	83	64	42	8	4				SM	106.7	1709	12.5				
														SM	112.6	1804	11.5	62.4	0.50		
														SM	124.2	1989	7.6	57.3	0.36		
			100	97	83	56	40	20	4	2				SM	112.7	1805	11.3	61.8	0.50		
														SM	118.0	1890	8.8	55.2	0.43		
		100	93	85	69	39	25	15	2	1			NP	SM	118.6	1900	8.8	56.3	0.42		
														SM	112.1	1796	13.6	68.8	0.53		
			100	99	96	68	47	26	8	4				SM	108.7	1741	13.2	64.8	0.55		
														SM	120.8	1935	9.1	62.5	0.40		
														SM	121.8	1951	9.8	68.7	0.38		
														CL	115.3	1847	10.7	77.8	0.37		
					100	99	95	86	55	40	50	20	30	CL/CH	112.5	1802	16.4	88.9	0.50		
					100	94	88	62	10	5				ML	109.5	1754	15.8	79.1	0.54		
														SC	124.0	1986	11.6	87.2	0.36		
		100	97	86	69	36	23	14	3	2			NP	SM	128.9	2065	7.7	67.5	0.31		
													NP	ML	119.3	1911	10.8	70.6	0.41		
					100	94	87	58	13	6				ML	108.1	1732	12.1	58.5	0.56		
														ML	107.8	1727	14.2	68.0	0.56		
	100	96	87	71	55	32	16	9						SP/SM	123.6	1980	10.2	75.6	0.36		
														GM	136.3	2183	6.9	79.4	0.24		
														GM	134.2	2150	7.8	82.5	0.26		
		100	96	87	71	40	26	18	9	4	50	24	26	SC	122.4	1961	6.2	56.2	0.30		
			100	99	95	63	47	41	14	5	35	18	17	SC	108.8	1743	15.2	75.0	0.55		
											67	28	39	SC	110.9	1776	14.7	76.6	0.52		
														SC	120.6	1932	7.7	52.0	0.40		
														SC	120.3	1927	7.1	47.9	0.40		
		100	98	94	82	50	38	29			37	21	16	SC	119.9	1921	5.4	37.0	0.39		
			100	97	84	50	28	22	10	8				SC	116.1	1860	9.8	58.6	0.45		
			100	87	70	43	32	25			42	20	22	SC	128.9	2065	7.4	64.8	0.31		
														SC	117.3	1879	13.2	81.6	0.44		
		100	99	95	75	40	26	18	5	3				SC	121.9	1953	9.7	84.3	0.31		
														SC	127.8	2047	5.5	46.5	0.32		
														SM	113.1	1812	10.9	60.1	0.49		
			100	87	70	43	32	24	5	1				SM	117.9	1889	11.4	71.7	0.43		
														SM	124.1	1988	8.6	64.9	0.36		
														SM	124.5	1994	8.0	61.0	0.35		
														SM	120.1	1924	10.5	70.3	0.40		
		100	86	77	65	41	32	25			28	20	8	SC	119.1	1908	12.1	82.6	0.39		
	100	98	92	77	60	23	13	9	1	1				SW/SM	138.5	2219	5.2	68.5	0.20		
														SM	125.2	2006	9.7	76.1	0.35		
														SM	125.5	2010	9.0	71.1	0.34		
														SW/SM	117.1	1876	11.3	69.5	0.44		

is included in this appendix.

TERBERG LIMITS		USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAXIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m ³)				(pcf)	(kg/m ³)								
		SM	106.7	1709	12.5							*					
		SM	112.6	1804	11.5	62.4	0.50										
		SM	124.2	1989	7.6	57.3	0.36										
		SM	112.7	1805	11.3	61.8	0.50										
		SM	118.0	1890	8.8	55.2	0.43										
	NP	SM	118.6	1900	8.8	56.3	0.42										
		SM	112.1	1796	13.6	68.8	0.53						*				
		SM	108.7	1741	13.2	64.8	0.55					*					
		SM	120.8	1935	9.1	62.5	0.40										
		SM	121.8	1951	9.8	68.7	0.38										
		CL	115.3	1847	10.7	77.8	0.37						*				
20	30	CL/CH	112.5	1802	16.4	88.9	0.50										
		ML	109.5	1754	15.8	79.1	0.54										
		SC	124.0	1986	11.6	87.2	0.36										
	NP	SM	128.9	2065	7.7	67.5	0.31										
	NP	ML	119.3	1911	10.8	70.6	0.41										
		ML	108.1	1732	12.1	58.5	0.56					*					
		ML	107.8	1727	14.2	68.0	0.56										
		SP/SM	123.6	1980	10.2	75.6	0.36										
		GM	136.3	2183	6.9	79.4	0.24										
		GM	134.2	2150	7.8	82.5	0.26										
24	26	SC	122.4	1961	6.2	56.2	0.30						*				
18	17	SC	108.8	1743	15.2	75.0	0.55							*			
28	39	SC	110.9	1776	14.7	76.6	0.52										
		SC	120.6	1932	7.7	52.0	0.40										
		SC	120.3	1927	7.1	47.9	0.40								*		
21	16	SC	119.9	1921	5.4	37.0	0.39						*				
		SC	116.1	1860	9.8	58.6	0.45					*					
20	22	SC	128.9	2065	7.4	64.8	0.31										
		SC	117.3	1879	13.2	81.6	0.44										
		SC	121.9	1953	9.7	84.3	0.31						*				
		SC	127.8	2047	5.5	46.5	0.32										
		SM	113.1	1812	7.9	60.1	0.49					*					
		SM	117.9	1889		71.7	0.43					*					
		SM	124.1	1988		64.9	0.36					*					
		SM	124.5	1994	8.0	61.0	0.35										
		SM	120.1	1924	10.5	70.3	0.40										
20	8	SC	119.1	1908	12.1	82.6	0.39										
		SW/SM	138.5	2219	5.2	68.5	0.20				2.67						
		SM	125.2	2006	9.7	76.1	0.35										
		SM	125.5	2010	9.0	71.1	0.34										
		SW/SM	117.1	1876	11.3	69.5	0.44					*					

SUMMARY OF LABORATORY TEST RESULTS
PAGE 15 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAWSO

TABLE
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FUGRO NATIONAL, INC.

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APPROVED BY

CHECKED BY

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT								
				STANDARD SIEVE OPENING							U S STAI	
		FEET	METERS	BLDRS	COBBLES		GRAVEL					SA
				24"	12"	6"	3"	1½"	3/4"	3/8"	4	10
LD-D-3	P-15	175.6-176.5	53.52-53.80					100	81	72	57	44
	P-16	200.0-201.3	60.96-61.36									
	P-17	225.0-226.3	68.58-68.98						100	94	71	48
	P-18	250.0-250.6	76.20-76.38									
	P-19	275.0-276.3	83.82-84.22					100	98	94	83	66
	P-20	300.0-300.6	91.44-91.56					100	98	97	89	77
	P-21	350.0-351.0	106.68-106.98									
	P-22	400.0-400.6	121.92-122.10								100	98
	P-23	450.0-450.6	137.16-137.34						100	88	71	55
LD-T-1**	B-1	0.0-0.5	0.00-0.15							100	98	93
	B-2	2.0-3.0	0.61-0.91						100	95	92	82
	B-3	7.0-8.0	2.13-2.44							100	95	77
	B-4	12.0-13.0	3.66-3.96									100
	B-5	15.0-16.0	4.57-4.88									
	B-6	18.0-19.5	5.49-5.94									
LD-T-2**	B-1	0.0-1.0	0.00-0.30								100	99
	B-2	6.0-8.0	1.83-2.44						100	96	94	89
	B-3	18.0-20.0	5.49-6.10						100	92	91	86
LD-T-3**	B-2	5.0-6.5	1.52-1.98						100	93	89	80
	B-3	18.0-20.0	5.49-6.10				100	92	83	78	69	58
LD-T-4**	B-1	0.0-1.0	0.00-0.30							100	98	93
	B-2	3.0-5.0	0.91-1.52							100	99	96
	B-3	18.0-20.0	5.49-6.10							100	95	77
LD-T-5**	B-1	0.0-0.5	0.00-0.15						100	92	85	72
	B-2	0.5-1.5	0.15-0.46							100	99	94
	B-3	10.0-20.0	3.05-6.10							100	98	96
LD-T-6**	B-1	0.0-0.5	0.00-0.15							100	94	79
	B-2	3.0-4.0	0.91-1.22					100	93	92	85	69
LD-T-7**	B-1	0.0-1.0	0.00-0.30							100	97	74
	B-2	6.0-8.0	1.83-2.44						100	97	85	64
	B-3	19.0-21.0	5.79-6.40							100	96	81
LD-T-8**	B-1	0.0-1.0	0.00-0.30							100	96	80
	B-2	3.0-5.0	0.91-1.52						100	99	91	77
	B-3	17.0-19.0	5.18-5.79							100	97	80

*Indicates that test has been performed and results are included in this appendix.
 **Trench

PERCENT FINER BY WEIGHT											ATTERBERG LIMITS			USCS	IN-SITU					COMPACT	
SIEVE OPENING				U S STANDARD SIEVE NO.				PARTICLE SIZE (mm)							DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY	
GRAVEL				SAND			SILT OR CLAY			(pcf)					(kg/m ³)	(pcf)				(kg/m ³)	
"	1½"	3/4"	3/8"	4	10	40	100	200	.005	.001	LL	PL	PI								
	100	81	72	57	44	22	14	8						SW/SM	126.0	2018	7.0	56.3	0.34		
														SM	123.6	1980	9.2	68.6	0.36		
		100	94	71	48	17	8	4					NP	SW	122.4	1961	10.4	74.6	0.38		
														SM	129.2	2070	6.3	87.3	0.19		
	100	98	94	83	66	39	26	17	2	1				SM	128.7	2062	8.5	74.0	0.31		
	100	98	97	89	77	48	33	26	7	5				SM	122.6	1964	9.1	65.7	0.37		
														SM	120.8	1935	10.6	72.9	0.39		
				100	98	92	84	67	6	3			NP	ML	118.6	1900	12.7	81.4	0.42		
		100	88	71	55	32	20	15						SM	132.9	2129	6.4	64.9	0.27		
			100	98	93	71	50	33	9	4				SM			1.5				
		100	95	92	82	53	23	15						SM			1.9				
			100	95	77	26	9	6						SW/SM			1.6				
					100	99	98	97	83	54	73	36	37	MH			17.5			104.0	1664
						100	98	96	74	40	61	27	34	CH			12.0				
						100	65	13						NP	SM		2.3				
				100	99	93	62	28	3	2				NP	SM		0.4				
		100	96	94	89	74	61	48	12	6	33	25	8	SM			1.9				
		100	92	91	86	70	55	33						NP	SM		3.4				
		100	93	89	80	43	19	10						NP	SW/SM						
00	92	83	78	69	58	29	13	12						SW/SM							
				100	98	93	71	48	27	5	2			NP	SM		0.6				
				100	99	96	84	79	66	20	8	35	21	14	CL		4.7			128.9	2064
				100	95	77	27	10	6						SW/SM		0.9				
		100	92	85	72	43	31	25	8	3					SM		0.9				
				100	99	94	67	44	34		24	16	8	SC			2.2				
				100	98	96	85	66	33	7	5			NP	SM		2.6				
				100	94	78	48	33	25	8	4	27	19	8	SC		1.2				
	100	93	92	85	65	33	22	17						NP	SM		1.1				
				100	97	74	29	15	7	2	2			NP	SW/SM		1.4				
		100	97	85	64	36	27	20	9	5	43	22	21	SC			1.1				
				100	96	82	52	40	33	12	8	29	17	12	SC		2.0				
				100	96	88	58	45	25						SM		0.7				
		100	99	91	73	38	31	26			54	22	32	SC			2.3				
				100	97	89	67	52	39	9	6	32	20	12	SC		2.4				

Included in this appendix.

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CHECKED BY _____ APPROVED BY _____

BORING NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING								U S S	
				BLDRS	COBBLES		GRAVEL						
		FEET	METERS	24"	12"	6"	3"	1½"	3/4"	3/8"	4	10	
LD-T-9**	B-1	0.0-1.0	0.00-0.30					100	92	86	81	70	
	B-2	8.0-10.0	2.44-3.05							100	96	70	
	B-3	19.0-21.0	5.79-6.40			100	77	73	70	67	58	41	
LD-T-10**	B-1	0.0-1.0	0.00-0.30							100	96	81	
	B-2	7.0-9.0	2.13-2.74							100	96	81	
	B-3	19.0-21.0	5.79-6.40						100	96	95	94	
LD-T-11**	B-1	0.0-1.0	0.00-0.30							100	96	94	
	B-2	7.0-9.0	2.13-2.74							100	97	81	
	B-3	19.0-21.0	5.79-6.40						100	93	83	61	
LD-T-12**	B-1	0.0-1.0	0.00-0.30						100	98	90	71	
	B-2	6.0-8.0	1.83-2.44						100	99	94	71	
	B-3	19.0-21.0	5.79-6.40						100	97	88	71	
LD-T-13**	B-1	0.0-1.0	0.00-0.30						100	99	97	91	
	B-2	7.0-10.0	2.13-3.05						100	98	90	71	
	B-3	19.0-21.0	5.79-6.40							100	97	81	
LD-T-14**	B-1	0.0-2.0	0.0-0.61		100	80	62	49	45	42	38	31	
	B-2	9.0-12.0	2.13-3.66								100	91	
	B-3	19.0-21.0	5.79-6.40						100	97	89	61	
LD-T-15**	B-1	0.0-1.0	0.00-0.30						100	98	88	61	
	B-2	4.0-7.0	1.22-2.13						100	98	93	71	
	B-3	12.0-14.0	3.66-4.27							100	94	71	
	B-4	18.0-20.0	5.49-6.10						100	99	97	71	
LD-T-16**	B-1	0.0-1.0	0.00-0.30							100	98	81	
	B-2	7.0-10.0	2.13-3.05								100	91	
LD-T-17**	B-1	0.0-1.0	0.00-0.30							100	98	91	
	B-2	8.0-11.0	2.44-3.35							100	99	91	
	B-3	15.0-17.0	4.57-5.18							100	99	91	
LD-T-18**	B-1	0.0-1.0	0.00-0.30							100	90	71	
	B-2	5.0-7.0	1.3-2.13						100	98	95	81	
	B-3	8.0-10.0	2.44-3.05			100	83	71	68	65	58	31	
	B-4	18.0-20.0	5.49-6.10				100	91	89	87	82	71	
LD-T-19**	B-1	0.5-1.5	0.15-0.46							100	93	81	
	B-2	3.0-6.0	0.91-1.83							100	99	81	

*Indicates that test has been performed and results are included in this appendix.
 **Trenches

PERCENT FINER BY WEIGHT											ATTERBERG LIMITS			USCS	IN-SITU					MAXI DRY DE
NO SIEVE OPENING				U S STANDARD SIEVE NO.				PARTICLE SIZE (mm)							DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	
GRAVEL				SAND				SILT OR CLAY												
3"	1½"	3/4"	3/8"	4	10	40	100	200	.005	.001	LL	PL	PI		(pcf)	(kg/m³)			(pcf)	
	100	92	86	81	70	45	34	23					NP	SM						
			100	96	76	49	37	28	12	8	42	22	20	SC					133.0	
77	73	70	67	58	41	21	16	12			37	20	17	SP/SC						
			100	96	89	60	37	20	5	4			NP	SM						
			100	96	86	53	38	27	10	8			NP	SM						
		100	96	95	90	68	55	39	14	10	34	20	14	SC						
			100	96	90	63	49	31	2	2			NP	SM						
			100	97	87	56	46	37			46	20	26	SC						
		100	93	83	63	36	26	20	9	6	38	19	19	SC						
			100	98	90	78	56	48	6	5			NP	SM						
			100	99	94	77	38	30	5	3	46	22	24	SC						
			100	97	88	70	33	26	7	4	67	27	40	SC						
			100	99	97	92	67	54	5	4			NP	SM						
			100	98	90	75	38	28	11	7	44	20	24	SC						
			100	97	88	52	38	26	11	8	43	23	20	SC						
62	49	45	42	38	30	11	6	3						GP						
			100	97	84	72	49	8	3				NP	SM						
		100	97	89	69	31	19	16	8	5	44	21	23	SC					133.0	
			100	98	88	63	26	17	11				NP	SW/SM						
			100	98	93	76	36	24	19		47	22	25	SC						
			100	94	74	26	14	8						SW/SM					130.5	
			100	99	97	79	33	19	16		51	25	26	SC						
			100	98	89	59	38	21	5	4			NP	SM						
			100	98	87	73	57	14	9				NP	ML						
			100	98	94	63	35	17	5	4			NP	SM						
			100	99	93	64	41	27					NP	SM						
			100	99	98	86	50	24	7	4			NP	SM						
			100	90	73	36	19	12						SW/SM						
		100	98	95	81	39	17	8						SW/SM						
83	71	68	65	58	38	11	5	4						SP						
100	91	89	87	82	70	36	22	14					NP	SM						
			100	93	82	60	43	31	6	5			NP	SM						
			100	99	87	68	56	42					NP	SM						

re included in this appendix.

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TERBERG LIMITS		USCS	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m³)				(pcf)	(kg/m³)								
PL	PI																
22	NP	SM															
20	20	SC						133.0	2130	7.7						*	
	17	SP/SC															
	NP	SM															
	NP	SM															
20	14	SC															
	NP	SM															
20	26	SC															
19	19	SC															
	NP	SM															
22	24	SC															
27	40	SC															
	NP	SM															
20	24	SC															
23	20	SC														*	
		GP															
	NP	SM															
21	23	SC						133.0	2130	7.7						*	
	NP	SW/SM															
22	25	SC															
		SW/SM															
25	26	SC						130.5	2090	8.7							
	NP	SM															
	NP	ML															
	NP	SM															
	NP	SM															
	NP	SM															
		SW/SM															
		SW/SM															
		SP															
	NP	SM															
	NP	SM															
	NP	SM															

SUMMARY OF LABORATORY TEST RESULTS
PAGE 17 OF 18
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
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FUGRO NATIONAL, INC.

*Indicates that test has been performed and results are included in this appendix
 **Trench

are included in this appendix.

<p>SUMMARY OF LABORATORY TEST RESULTS PAGE 18 OF 18 LECHUGUILLA DESERT, ARIZONA</p>	
<p>WX SITING INVESTIGATION DEPARTMENT OF THE AIR FORCE - SAMS0</p>	<p>TABLE C-2</p>
<p>FUGRO NATIONAL, INC.</p>	

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BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (σ_3)		MAXIMUM DEVIATOR STRESS ($\sigma_1 - \sigma_3$)		STRAIN RATE		BACK PRESSURE	
		FEET	METERS			pcf	kg/m ³		ksf	kn/m ²	ksf	kn/m ²	(%/min)	(%/min)	ksf	kn/m ²
LD-B-1	P-4	20.0-20.6	6.10-6.28	SC	CD	117.0	1874	9.1	2.3	110	8.5	407	0.07	0	0	0
LD-B-17	P-4	20.0-20.6	6.10-6.28	SW/SM	CD	122.1	1956	11.1	5.8	278	21.7	1039	0.07	0	0	0
	P-4	20.6-21.2	6.28-6.46	SM	CD	117.3	1879	9.0	2.3	110	11.2	536	0.07	0	0	0
	P-4	21.5-22.1	6.55-6.74	SW/SM	CD	115.1	1844	10.2	11.5	551	42.6	2040	0.05	0	0	0
LD-C-1	P-10	90.0-90.6	27.45-27.63	SM	CD	110.5	1770	9.8	10.4	498	31.7	1518	0.04	0	0	0
	P-13	151.6-152.1	46.24-46.39	SC	CD	103.3	1655	11.7	17.3	828	41.5	1987	0.03	0	0	0
LD-C-2	P-10	80.0-80.6	24.40-24.58	SH	CD	97.2	1557	15.0	1.7	81	7.7	369	0.03	0	0	0
	P-10	80.6-81.2	24.58-24.76	SH	CD	96.0	1538	12.1	9.2	440	30.8	1475	0.04	0	0	0
	P-10	81.6-82.2	24.89-25.07	SM	CD	101.2	1621	18.5	17.3	828	52.5	2514	0.04	0	0	0
	P-15	175.6-176.2	53.55-53.74	CH	CD	99.7	1597	25.5	20.2	967	16.4	785	0.03	0	0	0
LD-C-3	P-5	30.0-30.6	9.15-9.33	SM	CD	105.3	1697	10.8	3.5	168	10.0	479	0.04	0	0	0
	P-11	90.0-90.6	27.45-27.63	SC	CD	109.6	1756	12.6	10.4	498	30.4	1456	0.05	0	0	0
	P-14	20.0-150.6	45.75-45.93	CL	CD	104.7	1677	11.5	17.3	828	62.3	2983	0.07	0	0	0
	P-18	251.0-251.6	76.55-76.74	CL	CD	106.1	1700	18.1	28.8	1379	41.3	1977	0.05	0	0	0
LD-C-4	P-4	20.0-20.6	6.10-6.28	SC	CD	120.9	1937	8.4	2.3	110	9.5	455	0.07	0	0	0
	P-9	70.0-70.6	21.35-21.53	SC	CD	120.1	1924	11.8	8.1	388	31.3	1499	0.07	0	0	0
LD-C-5	P-10	80.0-80.6	24.40-24.58	SC	CD	113.5	1818	12.7	10.4	498	29.8	1427	0.05	0	0	0
	P-16	200.0-200.6	61.00-61.18	SM	CD	121.1	1940	8.8	23.0	1101	85.4	4089	0.05	0	0	0
LD-C-6	P-4	30.0-30.6	9.15-9.33	SM	CD	96.6	1548	17.4	3.5	168	10.3	493	0.07	0	0	0

SUMMARY OF TRIAXIAL SHEAR TESTS
PAGE 1 OF 2
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
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UGRO NATIONAL, INC.

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (σ_3)		MAXIMUM DEVIATOR STRESS ($\sigma_1 - \sigma_3$)		STRAIN RATE ($\% \text{ min}^{-1}$)	BACK PRESSURE	
		FEET	METERS			pcf	kg/m ³		ksf	kn/m ²	ksf	kn/m ²		ksf	kn/m ²
LD-C-6	P-10	90.0-90.6	27.45-27.63	SM	CD	102.0	1634	13.5	10.4	498	26.9	1288	0.05	0	0
	P-12	125.0-125.6	38.12-38.31	ML	CD	99.6	1596	13.0	14.4	689	37.2	1781	0.05	0	0
LD-D-1	P-8	60.1-60.7	18.33-18.51	SC	CD	103.5	1658	6.7	6.9	330	23.4	1120	0.04	0	0
	P-8	60.7-61.3	18.51-18.69	SC	CD	105.2	1685	6.2	13.8	661	40.6	1944	0.07	0	0
	P-11	90.0-90.6	27.45-27.63	CL	CD	101.9	1632	6.6	10.4	498	30.7	1470	0.04	0	0
	P-14	150.0-150.6	45.75-45.93	CL	CD	103.5	1658	5.7	17.3	828	44.5	2131	0.04	0	0
	P-19	275.0-275.6	83.87-84.05	SM	CD	98.6	1580	17.0	31.7	1518	73.6	3524	0.04	0	0
	P-23	450.0-450.6	137.25-137.43	CL	CD	111.0	1778	16.2	51.8	2480	79.8	3821	0.04	0	0
LD-D-2	P-7	60.0-60.6	18.30-18.48	SM	CD	106.7	1709	12.5	6.9	330	20.1	962	0.05	0	0
	P-12	125.6-126.2	38.31-38.49	SM	CD	108.7	1741	13.2	14.4	689	35.6	1705	0.05	0	0
	P-18	275.0-275.6	83.87-84.06	ML	CD	108.1	1732	12.1	31.7	1518	80.5	3854	0.07	0	0
LD-D-3	P-5	30.0-30.6	9.15-9.33	SC	CD	116.1	1860	9.8	3.5	168	15.6	747	0.05	0	0
	P-8	60.0-60.6	18.30-18.48	SM	CD	113.1	1812	10.9	14.4	689	37.4	1791	0.07	0	0
	P-8	60.6-61.2	18.48-18.67	SM	CD	117.9	1889	11.4	1.4	67	6.0	287	0.07	0	0
	P-8	61.6-62.2	18.79-18.97	SM	CD	124.1	1988	8.6	7.2	345	30.0	1436	0.07	0	0
	P-15	175.0-175.6	53.38-53.56	SW/SM	CD	117.1	1876	11.3	20.2	967	74.0	3543	0.06	0	0
	P-20	300.0-300.6	91.50-91.68	SM	CD	122.6	1984	9.1	34.6	1657	118.8	5688	0.08	0	0

SUMMARY OF TRIAXIAL SHEAR TESTS
PAGE 2 OF 2
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
C-3

UGRO NATIONAL, INC.

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT/DIAMETER
		FEET	METERS		ksf	kn/m ²	pcf	kg/m ³			
LD-A-1	D-5	16.5-17.1	5.03-5.21	CH	3.5	168	109.2	1749	13.3	66.1	2.4
LD-A-4	D-2	5.8-6.3	1.77-1.92	SC/SM	7.3	350	112.4	1800	5.4	29.0	2.4
LD-A-6	D-5	20.5-21.0	6.25-6.40	SC	0.9	43	115.5	1850	3.2	18.6	2.4
LD-A-8	D-2	10.5-11.0	3.20-3.35	SC	7.8	374	104.2	1689	8.2	36.8	2.4
LD-A-10	D-1	5.5-6.0	1.68-1.83	SC	6.5	311	112.4	1800	5.7	30.9	2.4
LD-A-12	D-2	10.5-11.0	3.20-3.35	SC	2.4	115	108.4	1736	3.4	16.4	2.2
LD-B-1	P-3	15.0-15.6	4.57-4.76	SC/SM	0.8	38	119.0	1906	11.1	75.7	2.4
	P-5	30.0-30.6	9.15-9.33	SC/SM	0.4	19	115.4	1849	9.9	67.6	2.4
	P-10	80.0-80.6	24.40-24.58	SC	1.4	67	113.1	1812	9.5	71.7	2.4
LD-B-2	D-13	100.0-100.6	30.50-30.68	CL	16.6	795	116.8	1871	14.7	89.8	2.4
LD-B-7	D-2	10.5-11.0	3.20-3.35	SC	4.5	216	116.0	1858	4.1	24.7	2.4
LD-B-9	D-3	15.5-16.0	4.73-4.88	SM/SC	3.2	153	116.8	1871	3.2	19.3	2.4
LD-B-11	D-1	5.5-6.0	1.68-1.83	SC/SM	0.9	43	118.7	1901	1.4	9.0	2.4
LD-B-12	D-3	10.5-11.0	3.20-3.35	SC	1.8	86	122.7	1955	2.5	18.2	2.4
LD-B-14	D-9	60.5-61.0	18.45-18.60	CH	10.6	508	97.1	1555	26.2	96.1	2.4
LD-B-16	D-2	6.5-7.0	1.98-2.13	SC	3.2	153	119.0	1906	2.7	17.7	2.4
	D-11	50.5-51.0	15.40-15.56	CH	22.3	1068	105.8	1695	21.2	96.6	2.4
	D-15	90.0-90.5	27.45-27.60	CH	16.9	810	99.9	1600	24.3	95.6	2.4
LD-B-17	P-5	30.5-31.2	9.30-9.51	CH	14.1	675	111.0	1778	17.5	91.0	2.4
	P-7	50.6-51.1	15.43-15.58	CL	3.1	148	100.5	1610	16.0	79.7	2.4
LD-B-18	D-5	10.5-11.0	3.20-3.35	SM/SC	1.8	86	109.1	1748	6.4	30.0	2.2
LD-C-1	P-1	5.6-6.2	1.70-1.89	SC/SM	0.5	24	118.6	1900	9.3	69.3	2.4
	P-3	21.1-21.7	6.43-6.62	SM	0.4	19	117.3	1879	9.3	72.0	2.4
LD-C-2	P-3	15.0-15.6	4.57-4.76	SM	0.4	19	108.4	1736	16.0	78.2	2.4
	P-7	50.0-50.6	15.25-15.43	CH	9.5	455	104.5	1674	20.8	78.9	2.4
	P-15	175.0-175.6	53.38-53.56	CH	16.8	805	111.5	1786	12.6	100.0	2.4
	P-18	250.0-250.6	76.25-76.43	CL	13.6	651	102.0	1634	24.3	100.0	2.4

SUMMARY OF UNCONFINED COMPRESSION TESTS
PAGE 1 OF 2
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
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UGRO NATIONAL, INC.

[illegible]

SUMMARY OF UNCONFINED COMPRESSION TESTS
PAGE 2 OF 2
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

TABLE
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FUGRO NATIONAL, INC.

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	NORMAL STRESS		MAXIMUM SHEAR STRENGTH	
		FEET	METERS		ksf	kN/m ²	ksf	kN/m ²
LD-A-4	D-3	10.8-11.3	3.29-3.44	SM	1.3	62	1.8	86
	D-3	10.8-11.3	3.29-3.44	SM	4.0	192	4.2	201
	D-3	10.8-11.3	3.29-3.44	SM	8.0	383	8.6	412
LD-A-10	D-3	10.5-11.0	3.20-3.35	SC	1.3	62	3.7	177
	D-3	10.5-11.0	3.20-3.35	SC	4.0	192	7.2	345
	D-3	10.5-11.0	3.20-3.35	SC	8.0	383	10.6	508
LD-B-1	P-2	10.0-10.6	3.05-3.23	SC	1.2	57	2.1	101
	P-2	10.0-10.6	3.05-3.23	SC	4.0	192	5.2	249
	P-2	10.0-10.6	3.05-3.23	SC	8.0	383	9.6	460
LD-B-2	D-3	10.5-11.0	3.20-3.35	SP SM	1.2	57	1.2	57
	D-3	10.5-11.0	3.20-3.35	SP SM	4.0	192	3.0	144
	D-3	10.5-11.0	3.20-3.35	SP SM	8.0	383	6.1	292
LD-B-7	D-1	5.5-6.0	1.68-1.83	SC	0.7	34	1.6	77
	D-1	5.5-6.0	1.68-1.83	SC	2.0	96	2.4	115
	D-1	5.5-6.0	1.68-1.83	SC	4.0	192	5.1	244
LD-B-10	D-1	5.2-5.7	1.59-1.74	SC	0.7	34	1.4	67
	D-1	5.2-5.7	1.59-1.74	SC	2.0	96	3.5	168
	D-1	5.2-5.7	1.59-1.74	SC	4.0	192	5.0	239
LD-B-17	P-2	10.0-10.6	3.05-3.23	SM	1.2	57	1.0	48
	P-2	10.0-10.6	3.05-3.23	SM	4.0	192	3.9	187
	P-2	10.0-10.6	3.05-3.23	SM	8.0	383	6.8	326
LD-C-1	P-1	5.0-5.6	1.53-1.71	SC/SM	0.6	29	0.8	38
	P-2	15.0-15.6	4.58-4.76	SW/SM	1.7	81	1.9	91
LD-C-2	P-1	5.0-5.6	1.53-1.71	SM	0.6	29	0.9	43
	P-2	10.6-11.2	3.23-3.42	SM	1.3	62	1.4	67
	P-2	10.6-11.2	3.23-3.42	SM	4.0	192	3.4	163
	P-2	10.6-11.2	3.23-3.42	SM	8.0	383	5.1	244

SUMMARY OF DIRECT SHEAR TESTS
PAGE 1 OF 2
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
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UGRO NATIONAL, INC.

COMPOSITE SAMPLE NO.	SOIL TYPE	SPECIFIC GRAVITY	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)	COMPACTED DRY DENSITY		COMPACTED MOISTURE (%)	PERCENT OF MAXIMUM DRY DENSITY	CBR (%)
			pcf	kg/m ³		pcf	kg/m ³			
A	SM	2.74	133.0	2130	7.2	118.2	1893	7.2	88.9	7
						126.0	2018	7.8	94.7	59
						130.2	2086	7.0	97.9	111
B	SC/SM	2.67	132.5	2122	7.5	116.2	1861	7.5	87.7	15
						125.1	2004	7.2	94.4	44
						130.5	2090	7.1	98.5	153
C	SC	2.67	132.0	2114	8.0	114.6	1836	8.1	86.8	5
						123.6	1980	8.1	93.6	12
						129.2	2069	8.1	97.9	22
D	SC	2.67	135.0	2162	7.5	120.1	1924	7.2	89.0	8
						128.0	2050	7.1	94.8	22
						133.6	2140	7.1	99.0	82

CALIFORNIA BEARING RATIO
(CBR) TEST RESULTS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-6

UGRO NATIONAL, INC.

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	pH	WATER SOLUBLE		
						SODIUM	CHLORIDE	SULPHATE
		FEET	METERS			mg/kg	mg/kg	mg/kg
LD-A-3	S-5	15.0-16.5	4.57-5.03	SC	7.6	215	140	198
LD-A-5	D-4	15.5-16.0	4.72-4.88	SM	7.7	105	46	66
LD-A-6	D-2	10.5-11.0	3.20-3.35	SC	7.6	1315	1425	436
LD-A-8	D-6	25.5-26.0	7.77-7.92	ML	7.6	107	170	3
LD-A-9	S-5	15.0-16.2	4.57-4.97	SW/SM	7.5	69	69	11
LD-A-10	D-4	15.5-16.0	4.72-4.88	SC	7.5	1000	790	790
LD-B-2	S-4	16.5-18.0	5.03-5.49	SM	7.9	520	380	630
LD-B-4	B-4	10.0-15.0	3.05-4.57	SM	7.6	290	335	43
LD-B-7	D-2	10.5-11.0	3.20-3.35	SC	7.6	1475	1125	9490
LD-B-15	D-4	10.5-11.0	3.20-3.35	SM	8.1	1305	1580	272
LD-B-18	D-9	20.5-21.0	6.25-6.40	SC	7.9	1240	1630	171
LD-C-3	P-3	15.6-16.2	4.75-4.94	SC	7.8	1190	690	2610
LD-D-1	P-4	21.2-21.6	6.46-6.58	SC	8.0	950	840	610
LD-T-1	B-5	15.0-16.0	4.57-4.88	CH	7.7	3375	4570	730
LD-T-5	B-2	0.5-1.5	0.15-0.46	SC	7.5	1775	3160	560
LD-T-9	B-2	8.0-10.0	2.44-3.05	SC	8.0	715	595	358
LD-T-13	B-3	19.0-21.0	5.79-6.40	SC	7.7	838	720	760
LD-T-14	B-3	19.0-21.0	5.79-6.40	SC	7.9	365	265	2010













CHEMICAL TEST RESULTS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

TABLE
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FUGRO NATIONAL, INC.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

SYMBOLS	DESCRIPTION
 GW	Well graded gravels, gravel-sand mixtures, little or no fines.
 GP	Poorly graded gravels or gravel sand mixtures, little or no fines.
 GM	Silty gravels, gravel-sand-silt mixtures.
 GC	Clayey gravels, gravel-sand-clay mixtures.
 SW	Well graded sands, gravelly sands, little or no fines.
 SP	Poorly graded sands or gravelly sands, little or no fines.
 SM	Silty sands, sand-silt mixtures.
 SC	Clayey sands, sand-clay mixtures.
 ML	Inorganic silts and very fine sands, clayey silts with slight plasticity.
 MH	Inorganic clayey and elastic silts of high plasticity.
 CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays,
 CH	Inorganic clays of high plasticity.

UNIFIED SOIL CLASSIFICATION SYSTEM
(USCS) PAGE 1 OF 2
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-1

UGRO NATIONAL, INC.

Unified Soil Classification System (USCS) - Identification and Description

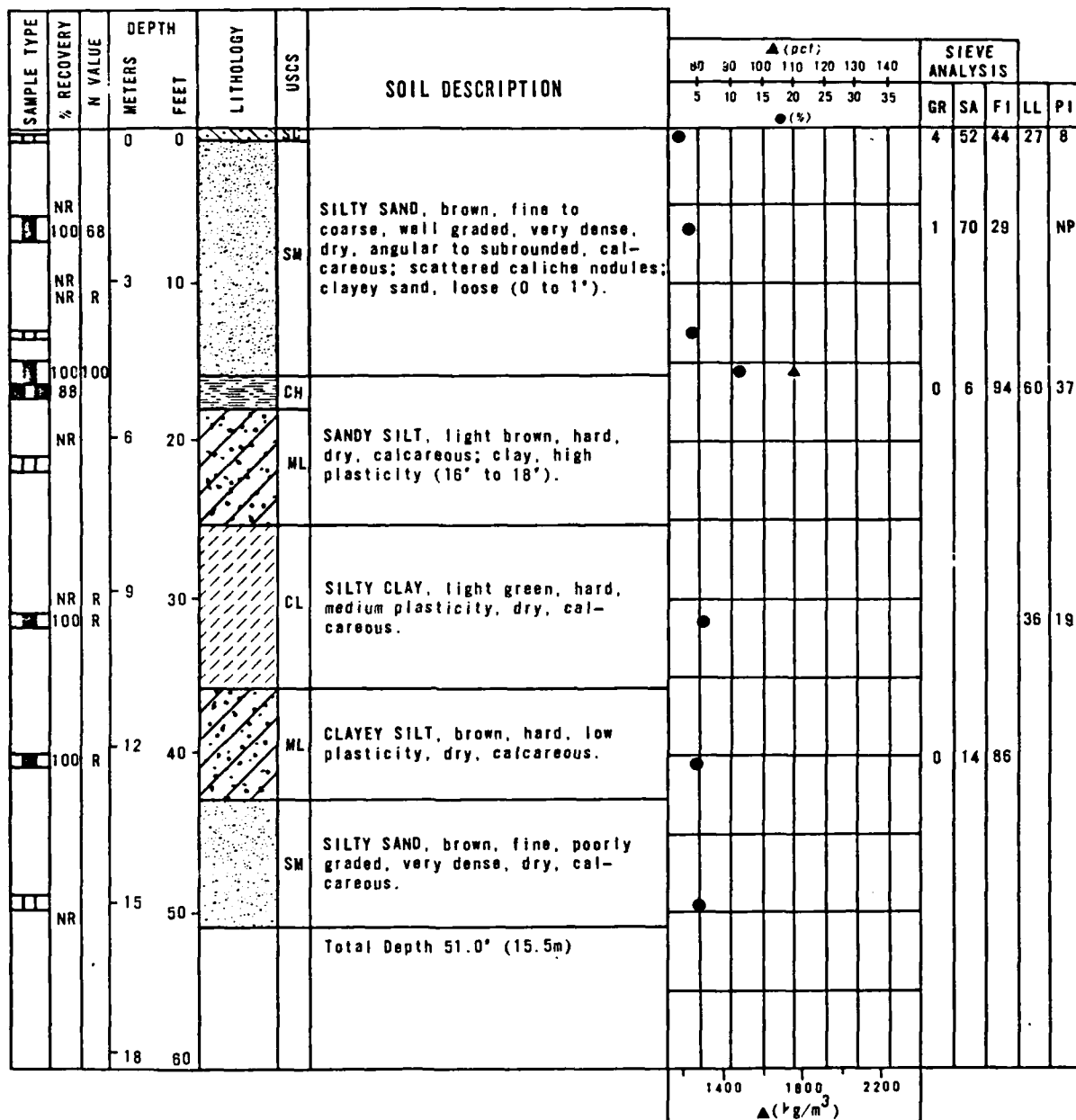
USCS Symbol	USCS Name	Field Identification Procedure (For Identification and Description)	USCS Description
GW	Well-sorted gravel, gravel sand mix (little or no fines)	With large in-situ gravel and sand, mostly of all intermediate particle sizes.	Not applicable to this soil type.
GP	Poorly-sorted gravel, gravel sand mix (little or no fines)	Primarily one size or a range of sizes with some intermediate sizes present.	Not applicable to this soil type.
GM	Silty gravel, gravel sand mixtures	Mostly one size or a range of sizes with low plasticity (CL or low).	Not applicable to this soil type.
GC	Clayey gravel, gravel sand mixtures	With large in-situ gravel and sand, mostly of all intermediate particle sizes.	Not applicable to this soil type.
GM	Well-sorted sand, gravelly sand, little or no fines	Primarily one size or a range of sizes with some intermediate sizes present.	Not applicable to this soil type.
SP	Poorly-sorted sand, gravelly sand, little or no fines	Mostly one size or a range of sizes with low plasticity (CL or low).	Not applicable to this soil type.
SM	Silty sand, sand silt mixtures	With large in-situ sand and silt, mostly of all intermediate particle sizes.	Not applicable to this soil type.
SC	Clayey sand, sand clay mixtures	Primarily one size or a range of sizes with some intermediate sizes present.	Not applicable to this soil type.
ML	Inorganic silts and very fine sands, rock flour, silt or clay, fine sands or silts with slight plasticity	None to slight	None
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Medium to high	Medium
OL	Organic silts and organic silty clays of low plasticity	Slight to medium	Slight
MP	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Slight to medium	Slight to medium
CH	Inorganic clays of high plasticity, fat clays	High to very high	High
OH	Organic clays of medium to high plasticity, organic clays	Medium to high	Slight to medium
PT	Preconsolidated clays, organic clays	Readily identified by field tests (e.g., field compression test) and can be identified by laboratory tests.	Readily identified by field tests (e.g., field compression test) and can be identified by laboratory tests.

UNIFIED SOIL CLASSIFICATION SYSTEM
(USCS) PAGE 2 OF 2
LECHUGUILLA DESERT, ARIZONA





MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-1

FUGRO NATIONAL, INC.



SAMPLE TYPES

-  STANDARD PENETRATION TEST
 FUGRO DRIVE
 BULK
 PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-87)
 R — N VALUE GREATER THAN 100 BLOWS/FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

BORING DETAILS

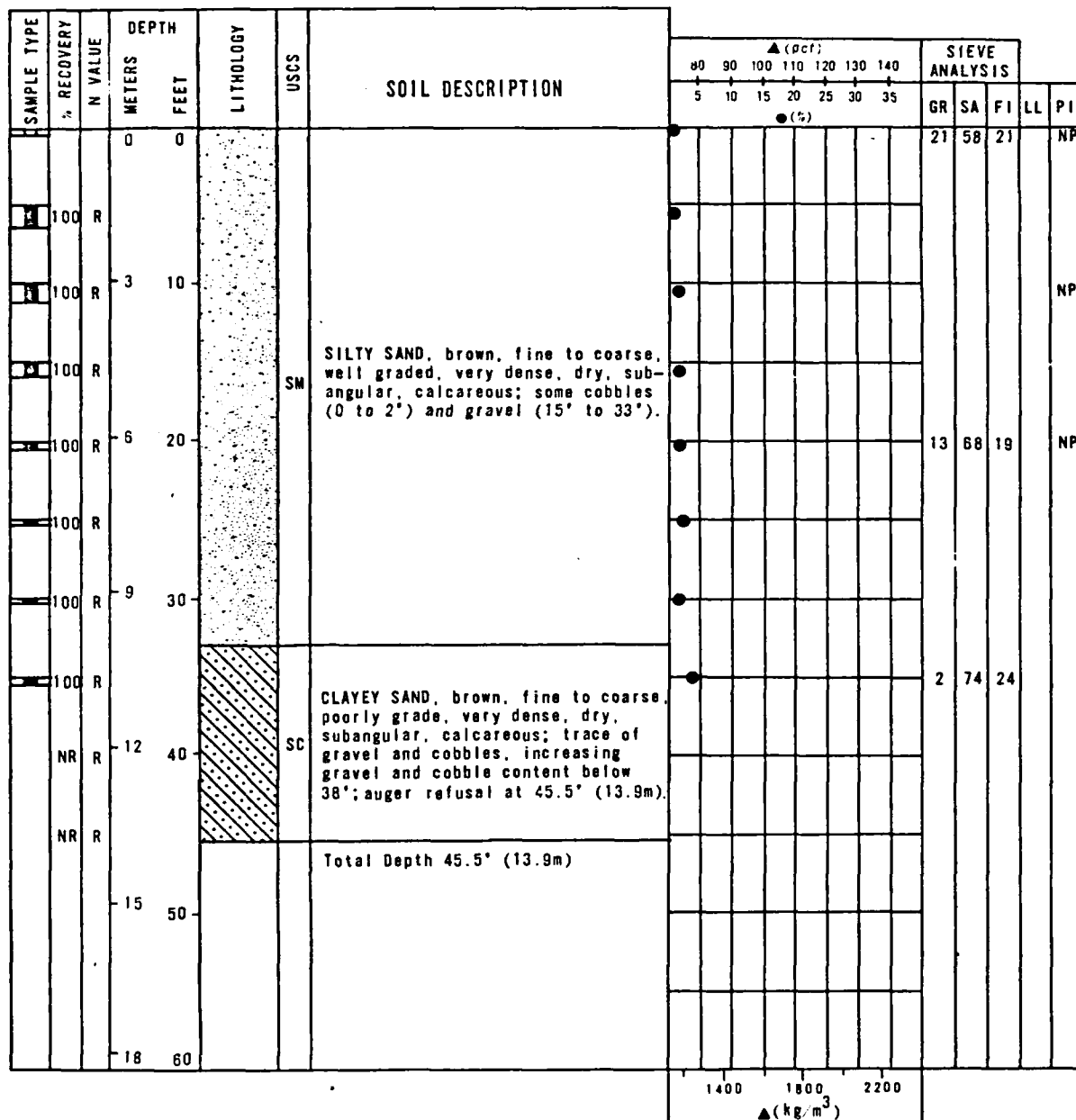
ELEVATION : 430' (131m)
 DATE DRILLED : 24 April 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS: Calp, NatG, NN, NG, GG, GM
 CASING INSTALLED: None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-1
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-2

FUGRO NATIONAL, INC.



SAMPLE TYPES

- ☒ STANDARD PENETRATION TEST
☒ FUGRO DRIVE
☐ BULK
☒ PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
 R — N VALUE GREATER THAN 100 BLOWS/FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

BORING DETAILS

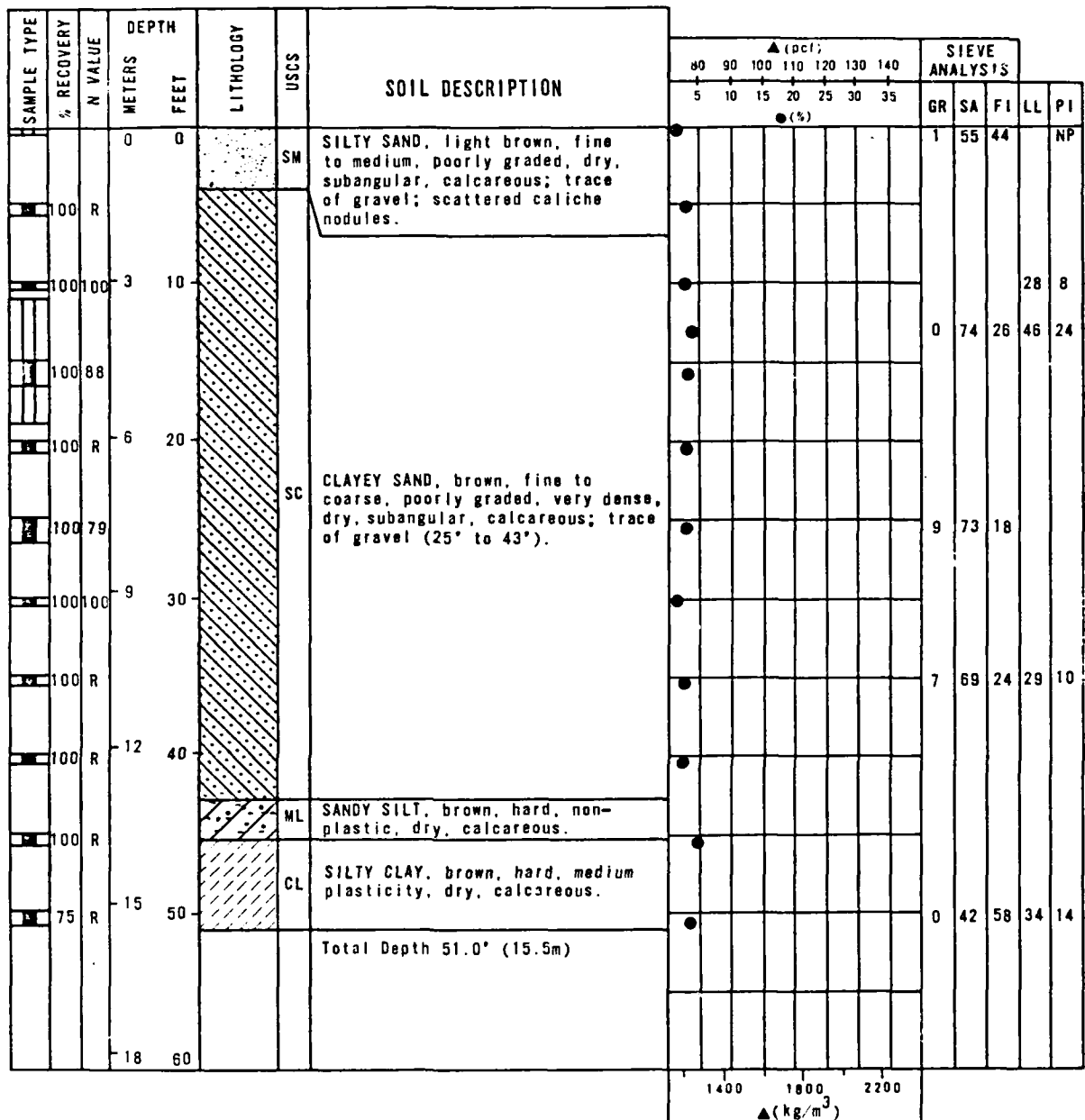
ELEVATION : 980' (299m)
 DATE DRILLED : 2 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS: Calp, NatG, NN, NG, GG, GM
 CASING INSTALLED: None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-2 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 C-3

FUGRO NATIONAL, INC.



SAMPLE TYPES

- STANDARD PENETRATION TEST
 FUGRO DRIVE
 BULK
 PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
 R — N VALUE GREATER THAN 100 BLOWS FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

BORING DETAILS

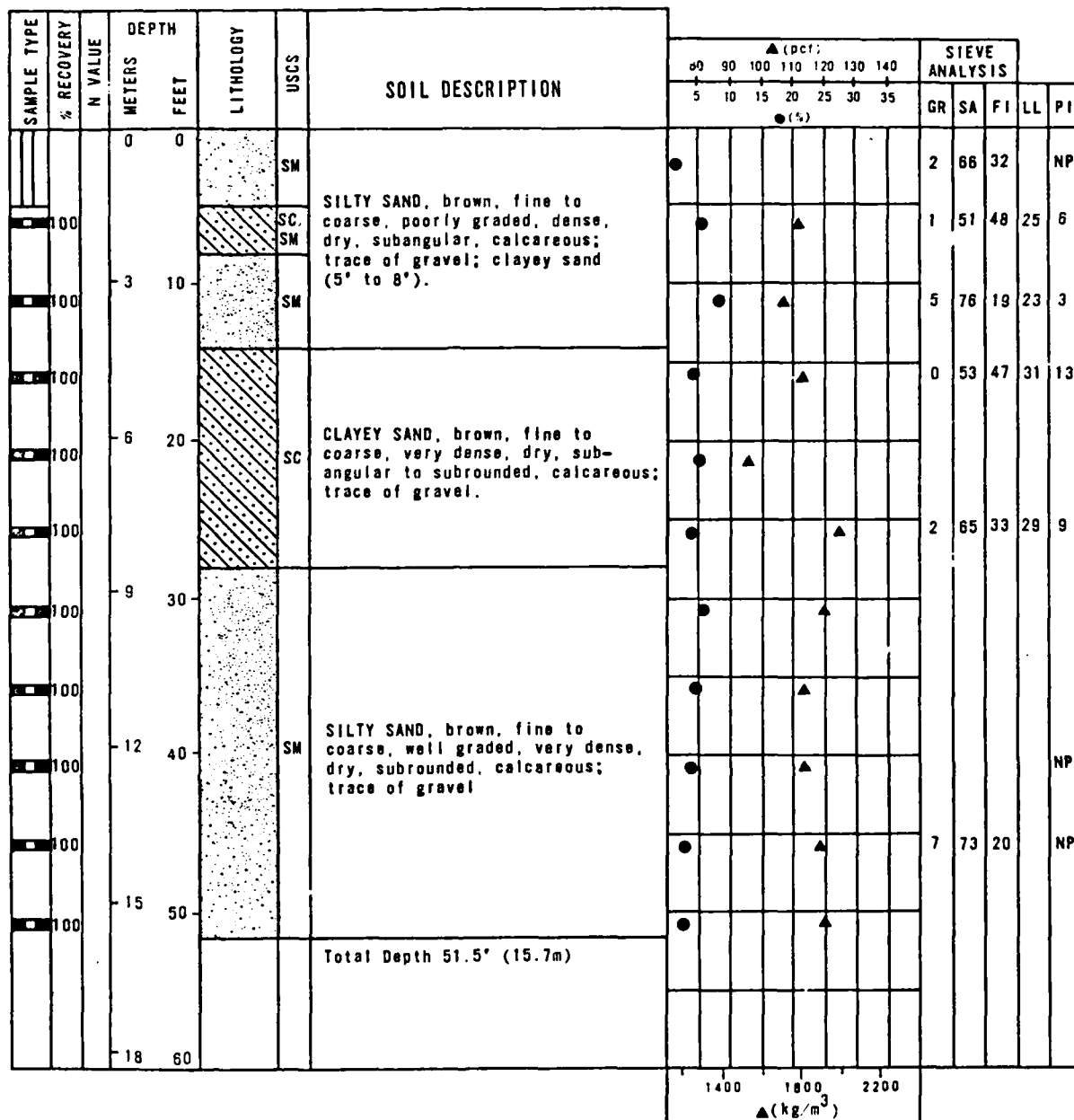
ELEVATION : 840' (256m)
 DATE DRILLED : 4 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS : None
 CASING INSTALLED : None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-3 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 C-4

FUGRO NATIONAL, INC.



SAMPLE TYPES

■ STANDARD PENETRATION TEST

■ FUGRO DRIVE

■ BULK

■ PITCHER TUBE

ENGINEERING PARAMETERS

N — STANDARD PENETRATION TEST (ASTM: D-1586-67)

R — N VALUE GREATER THAN 100 BLOWS FOOT

▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)

● — MOISTURE CONTENT (ASTM: D-2216-71)

NR — NO RECOVERY

BORING DETAILS

ELEVATION : 750' (229m)

DATE DRILLED : 5 May 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

GEOPHYSICAL LOGS : None

CASING INSTALLED : None

WATER LEVEL : Not Apparent

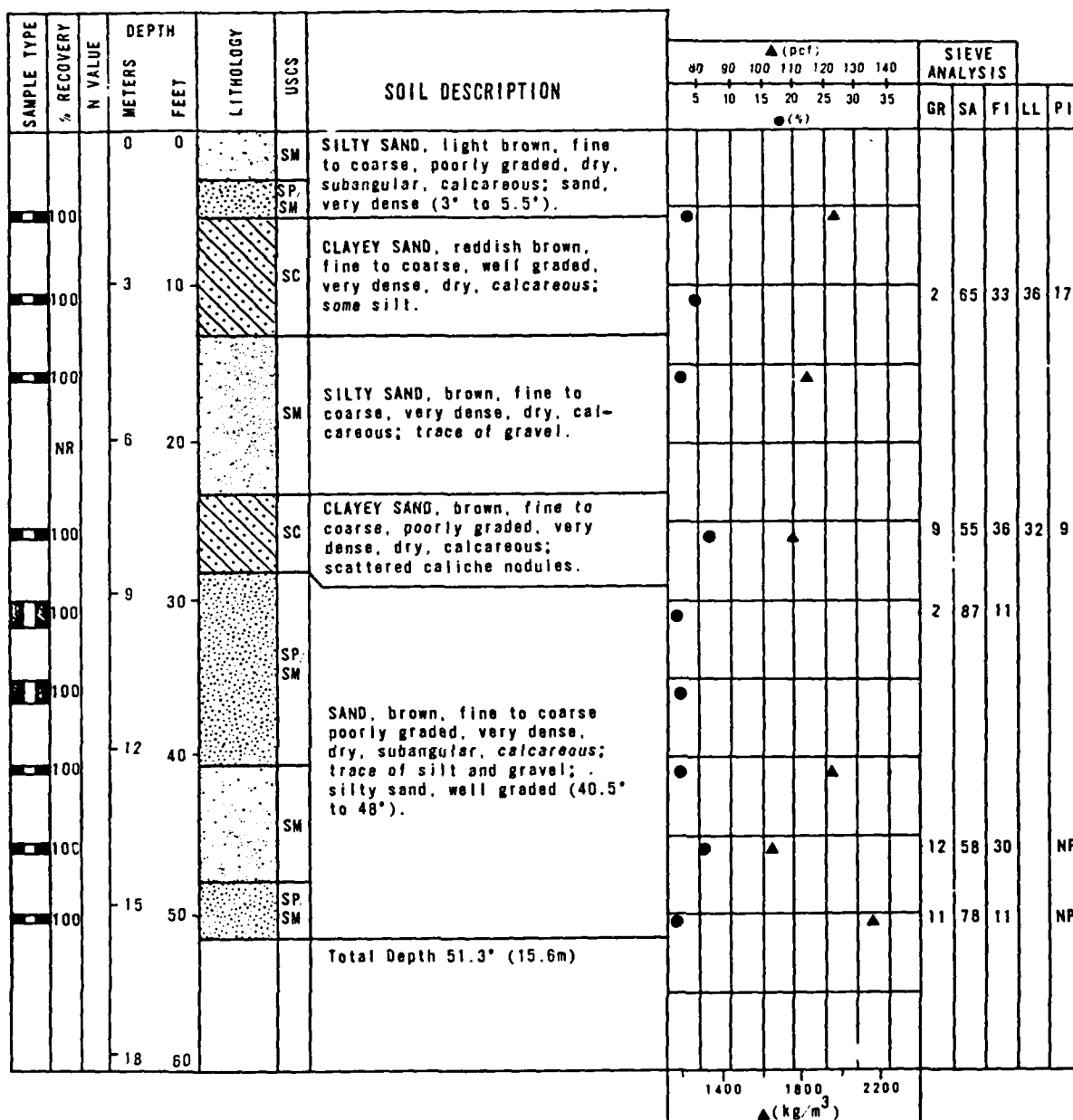
LOG OF BORING LD-A-4 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO





FIGURE

C-5

FUGRO NATIONAL, INC.



SAMPLE TYPES

-  STANDARD PENETRATION TEST
 FUGRO DRIVE
 BULK
 PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
 R — N VALUE GREATER THAN 100 BLOWS FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

BORING DETAILS

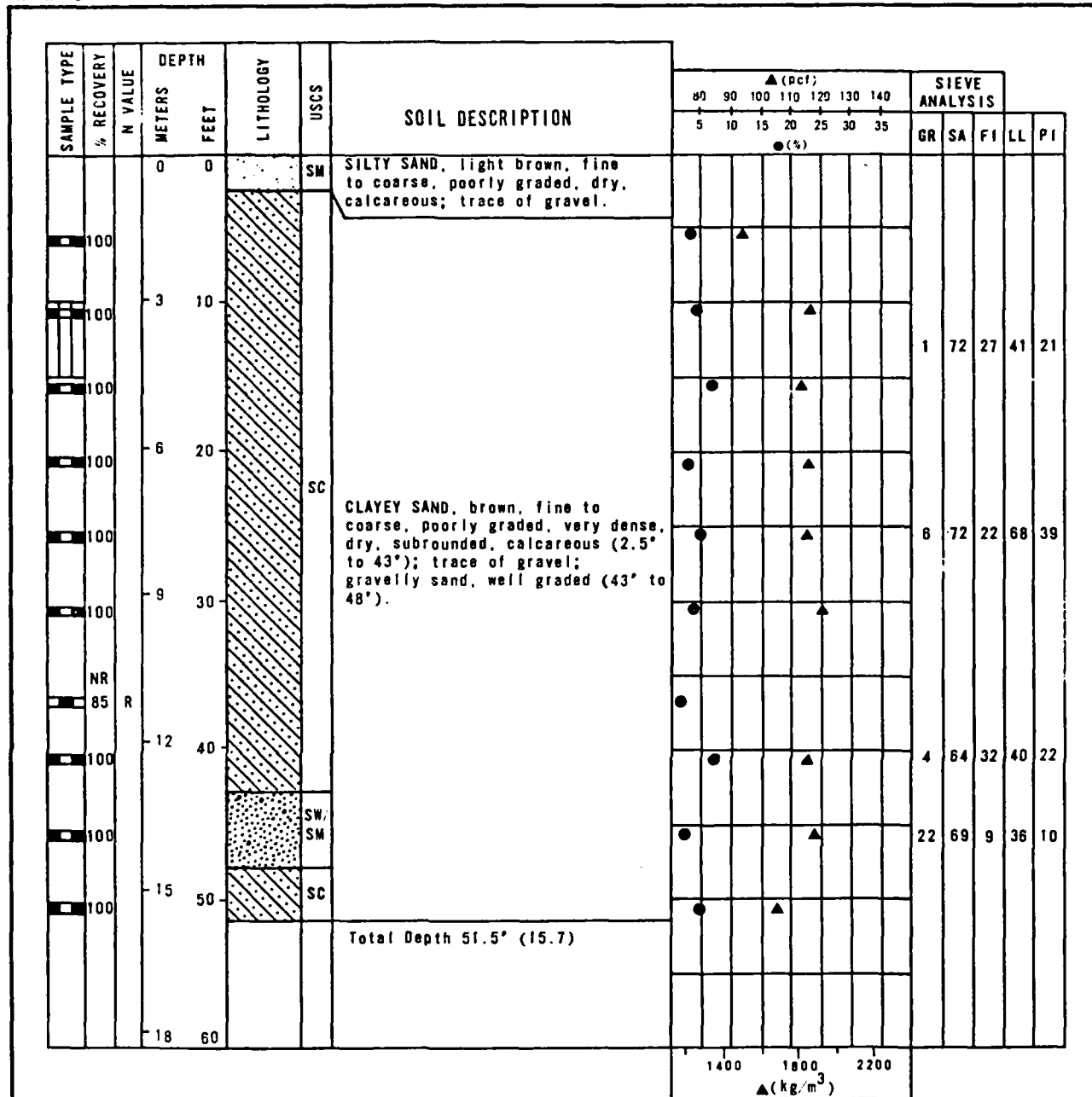
ELEVATION : 640' (195m)
 DATE DRILLED : 7 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS : None
 CASING INSTALLED : None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-5 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 C-6

FUGRO NATIONAL, INC.

 STANDARD PENETRATION TEST

FUGRO DRIVE



FUGRO DRIVE



BULK



PITCHER TUBE

N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
R — N VALUE GREATER THAN 100 BLOWS/FOOT
▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
● — MOISTURE CONTENT (ASTM: D-2216-71)
NR — NO RECOVERY

N — STANDARD PENETRATION TEST (ASTM: D-1586-67)

R — N VALUE GREATER THAN 100 BLOWS. FOOT

▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)

● — MOISTURE CONTENT (ASTM: D-2216-71)

NR — NO RECOVERY

ELEVATION : 940' (287m)
DATE DRILLED : 9 May 1977
DRILLING METHOD : Hollow Stem Auger
HOLE DIAMETER : 6 5/8" (168mm)
GEOPHYSICAL LOGS: None
CASING INSTALLED: None
WATER LEVEL : Not Apparent

ELEVATION : 940' (287m)

DATE DRILLED : 9 May 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

GEOPHYSICAL LOGS: None

CASING INSTALLED: None

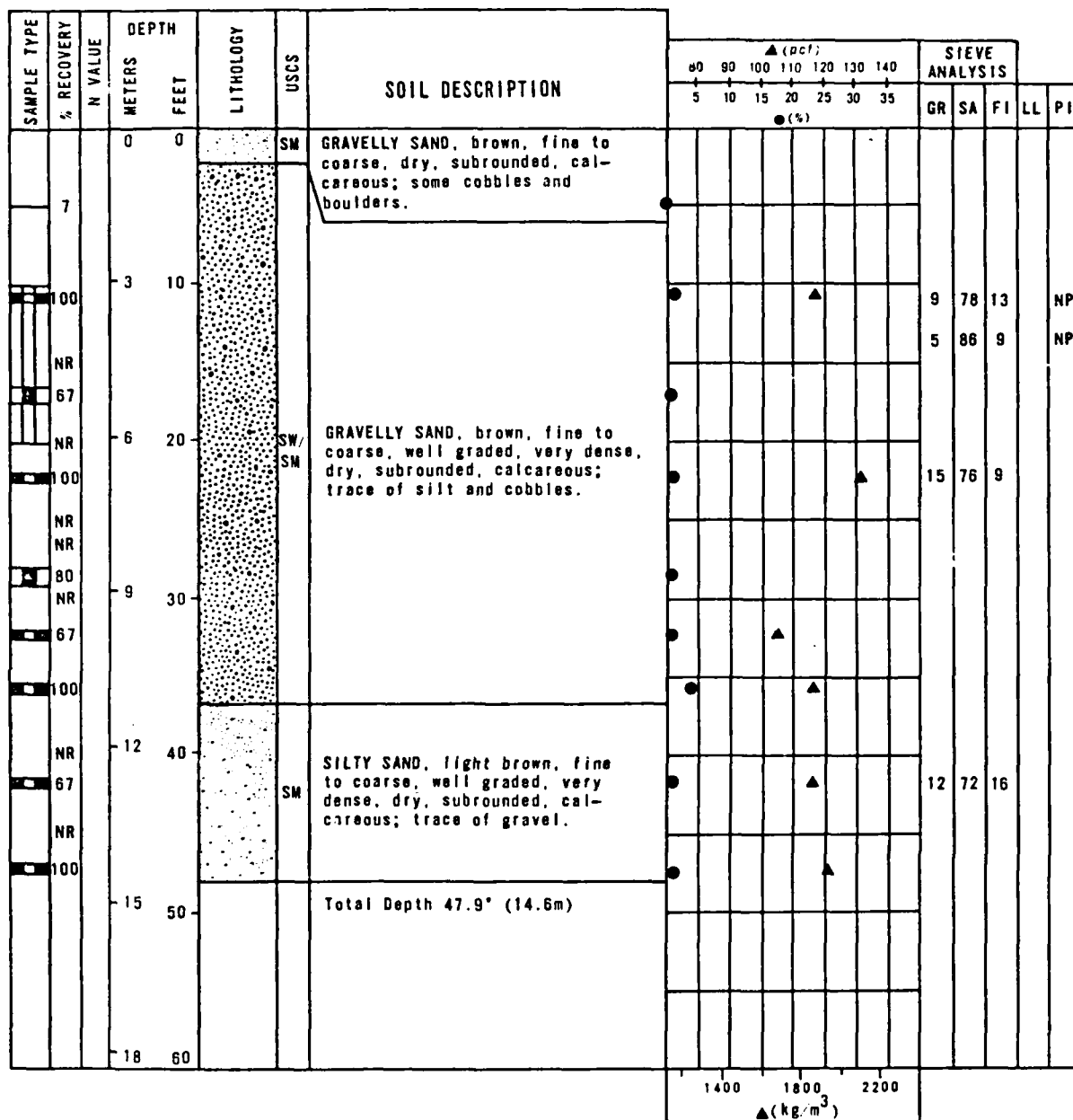
WATER LEVEL : Not Apparent

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO





FIGURE

C-7

FUGRO NATIONAL, INC.



SAMPLE TYPES

-  STANDARD PENETRATION TEST
 FUGRO DRIVE
 BULK
 PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
 R — N VALUE GREATER THAN 100 BLOWS FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

BORING DETAILS

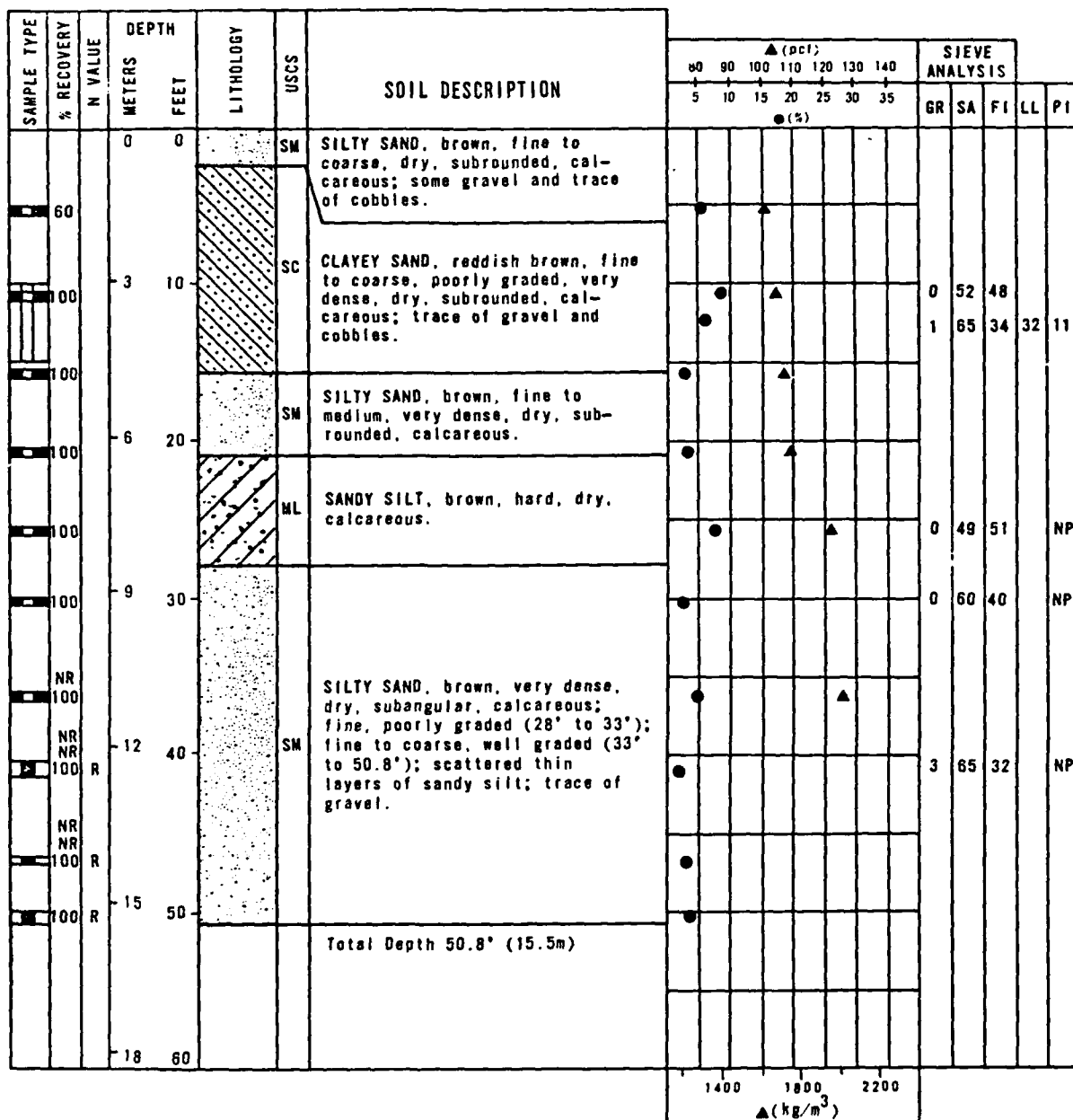
ELEVATION : 930' (284m)
 DATE DRILLED : 10 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS : None
 CASING INSTALLED : None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-7 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 C-8

FUGRO NATIONAL, INC.



SAMPLE TYPES

- ☐ STANDARD PENETRATION TEST
☐ FUGRO DRIVE
☐ BULK
☐ PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
 R — N VALUE GREATER THAN 100 BLOWS/FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

BORING DETAILS

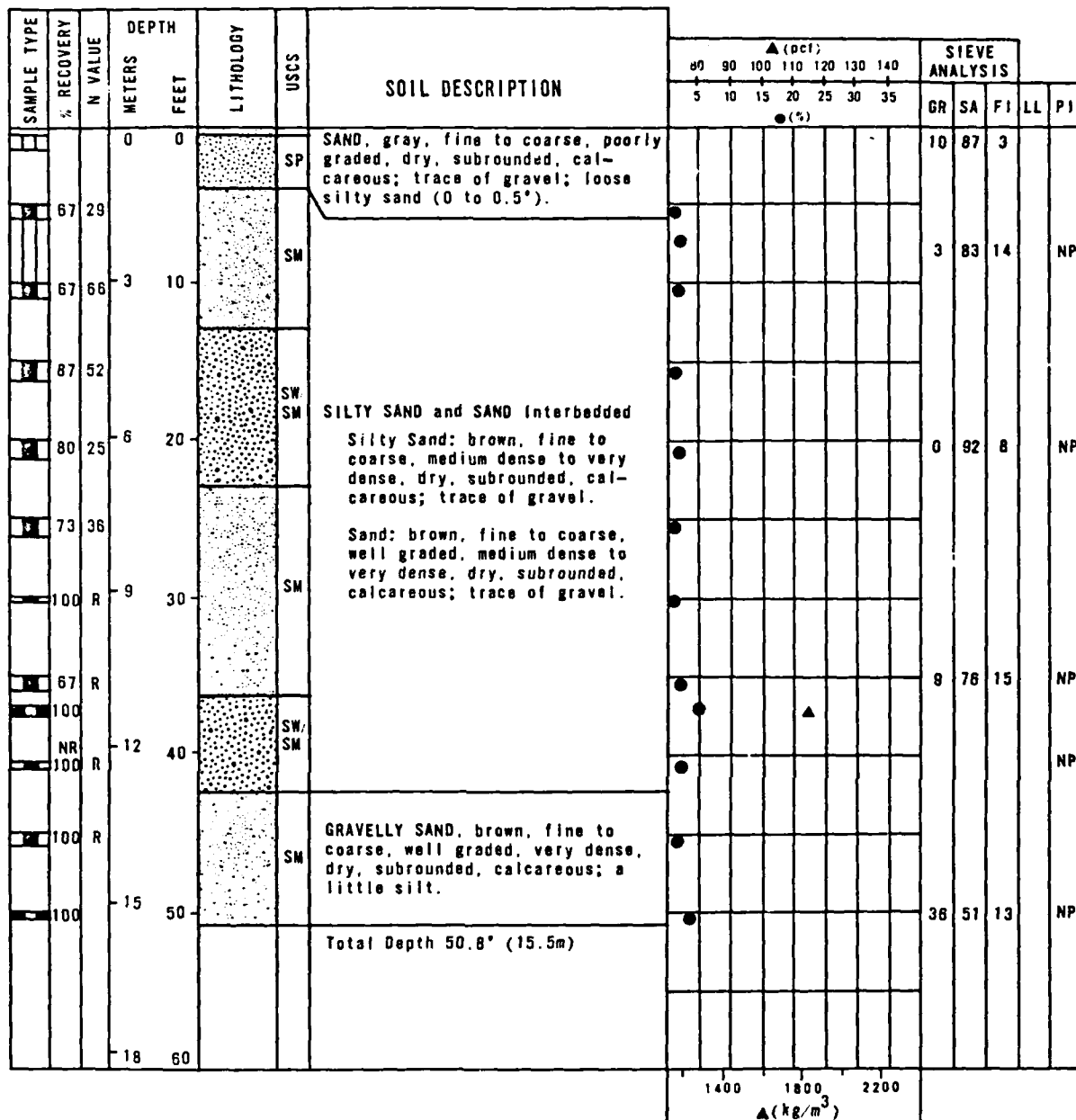
ELEVATION : 550' (168m)
 DATE DRILLED : 11 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS : None
 CASING INSTALLED : None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-8
LECHUGUILLA DESERT, ARIZONA





MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-9

FUGRO NATIONAL, INC.



SAMPLE TYPES

-  STANDARD PENETRATION TEST
 FUGRO DRIVE
 BULK
 PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
 R — N VALUE GREATER THAN 100 BLOWS/FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

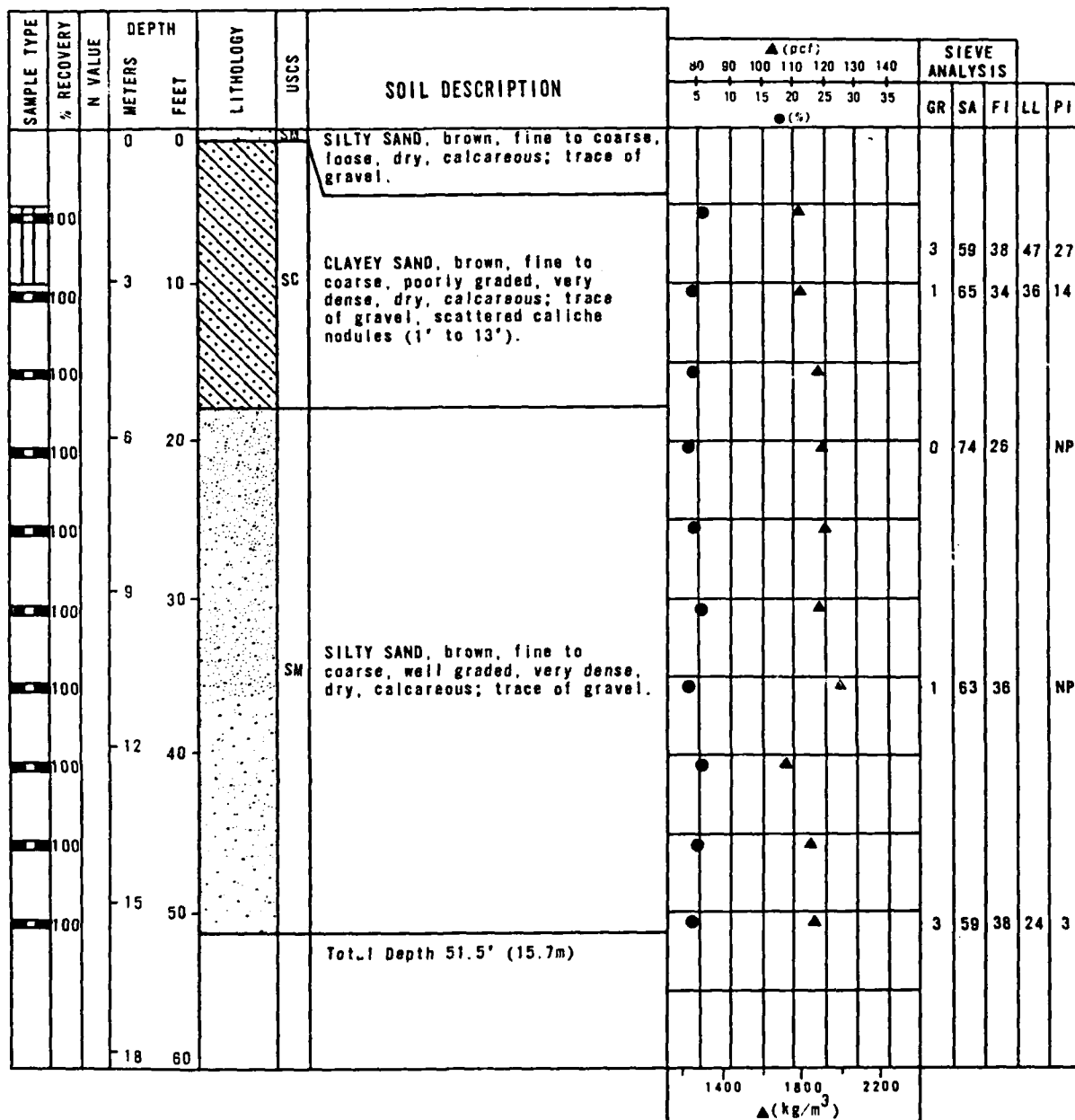
BORING DETAILS

- ELEVATION : 600' (183m)
 DATE DRILLED : 24 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 8 5/8" (168mm)
 GEOPHYSICAL LOGS: Calp, MatG, NN, NG, GG, GM
 CASING INSTALLED: None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-9
LECHUGUILLA DESERT, ARIZONA
 MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

 FIGURE
 C-10

FUGRO NATIONAL, INC.



SAMPLE TYPES

- STANDARD PENETRATION TEST
 FUGRO DRIVE
 BULK
 PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-87)
 R — N VALUE GREATER THAN 100 BLOWS/FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

BORING DETAILS

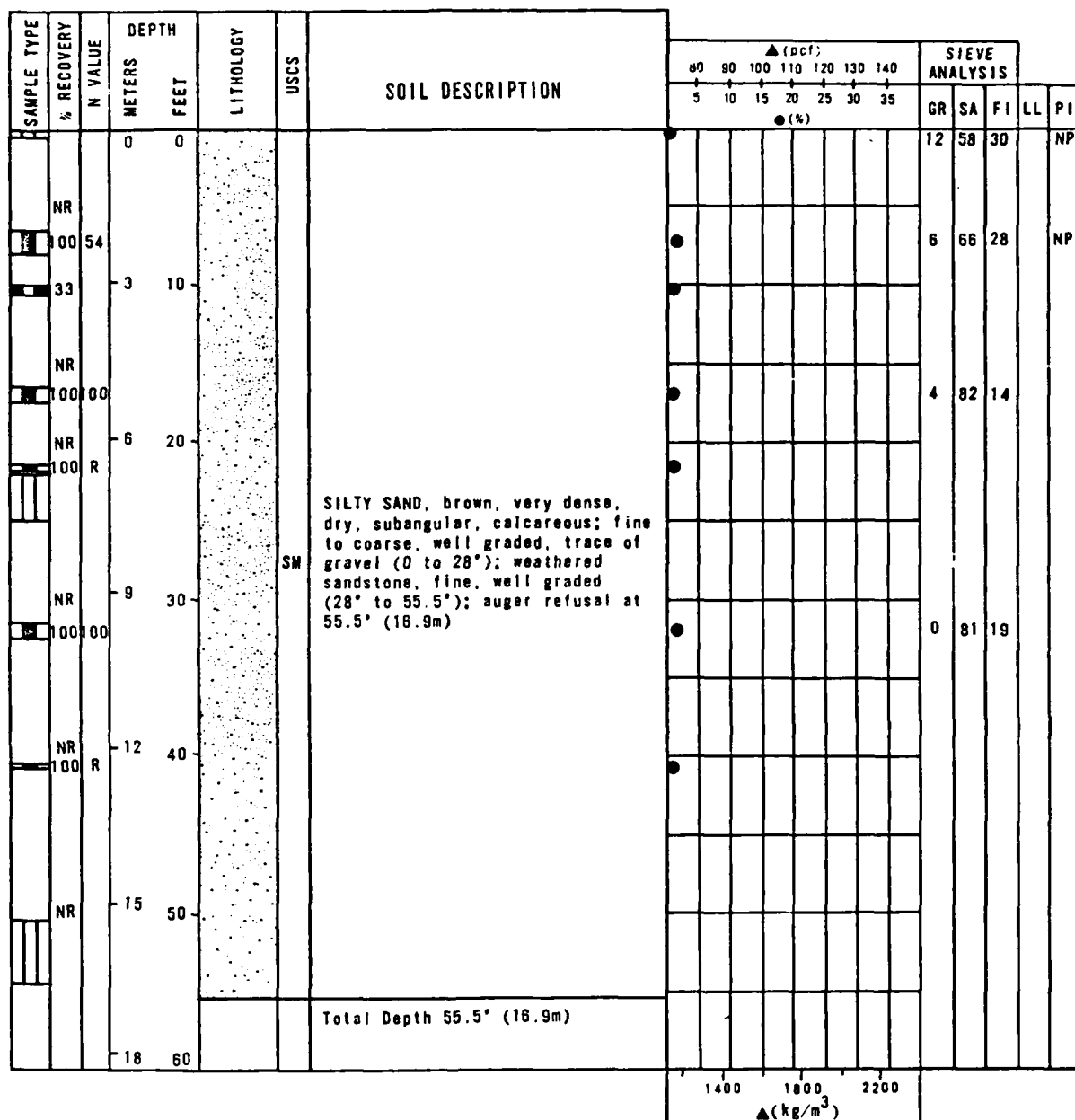
ELEVATION : 690' (210m)
 DATE DRILLED : 27 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 8.58" (198mm)
 GEOPHYSICAL LOGS : Calp, NatG, NN, NG, GG, GW
 CASING INSTALLED : None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-10 LECHUGUILLA DESERT, ARIZONA





MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSQ

FIGURE
C-11

FUGRO NATIONAL, INC.



SAMPLE TYPES

-  STANDARD PENETRATION TEST
 FUGRO DRIVE
 BULK
 PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
 R — N VALUE GREATER THAN 100 BLOWS/FOOT
 ▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● — MOISTURE CONTENT (ASTM: D-2216-71)
 NR — NO RECOVERY

BORING DETAILS

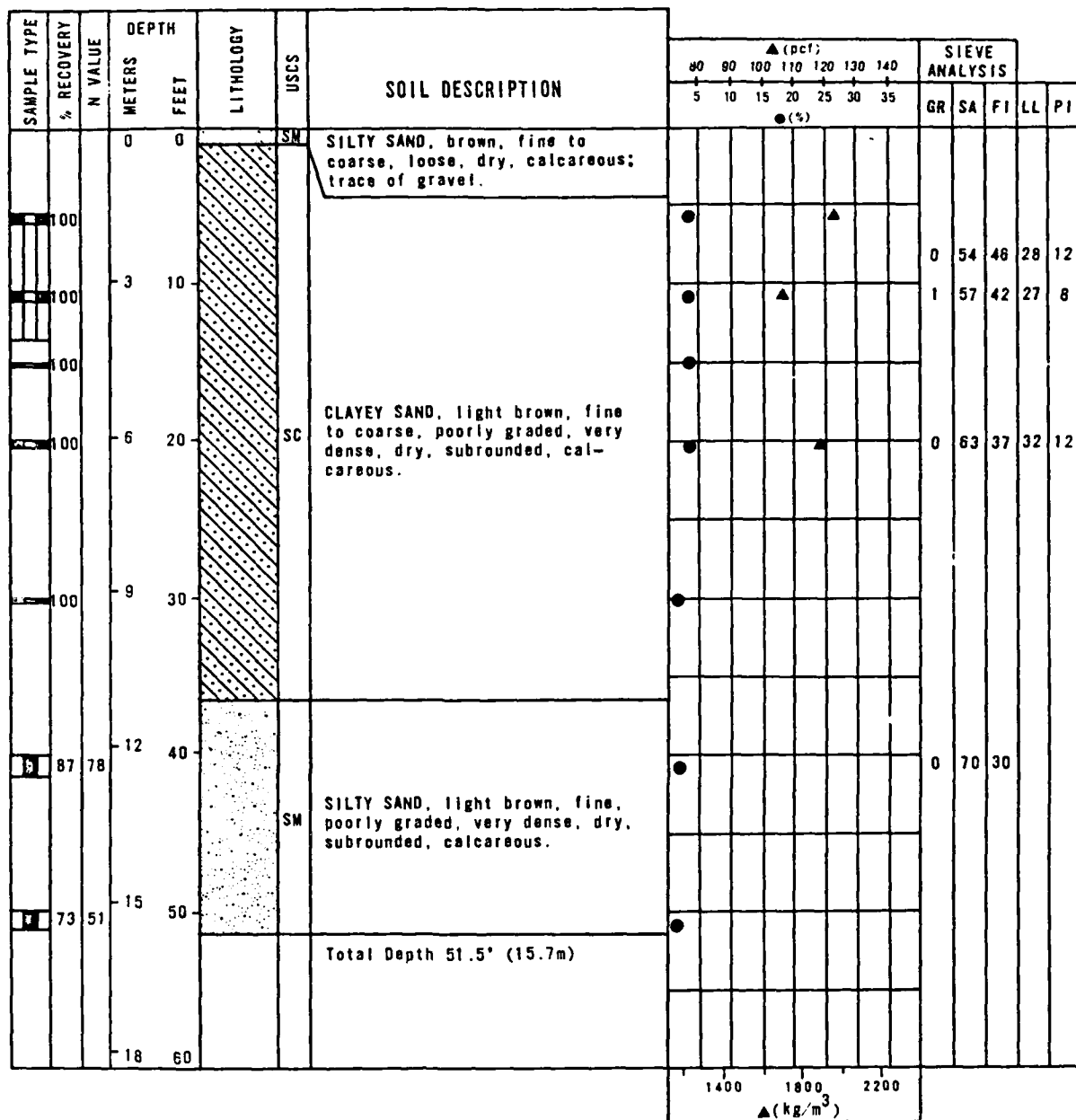
ELEVATION : 500' (152m)
 DATE DRILLED : 23 April 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 8 5/8" (168mm)
 GEOPHYSICAL LOGS : None
 CASING INSTALLED : None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-A-11
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-12

FUGRO NATIONAL, INC.



SAMPLE TYPES

- STANDARD PENETRATION TEST
 FUGRO DRIVE
 BULK
 PITCHER TUBE

ENGINEERING PARAMETERS

- N — STANDARD PENETRATION TEST (ASTM: D-1586-67)
R — N VALUE GREATER THAN 100 BLOWS/FOOT
▲ — DRY UNIT WEIGHT (ASTM: D-2937-71)
● — MOISTURE CONTENT (ASTM: D-2216-71)
NR — NO RECOVERY

BORING DETAILS

ELEVATION : 540' (165m)
DATE DRILLED : 26 May 1977
DRILLING METHOD : Hollow Stem Auger
HOLE DIAMETER : 8 5/8" (168mm)
GEOPHYSICAL LOGS: Calp, NatG, NW, NG, GG, GH
CASING INSTALLED: None
WATER LEVEL : Not Apparent

LOG OF BORING LD-A-12
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-13

FUGRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

FN-TR-19

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf)													SIEVE ANALYSIS				PI																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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			0	0		SM	SILTY SAND, light brown, fine to coarse, dry, subangular, calcareous.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				

CLAYEY SAND, reddish brown, fine to coarse, dense to very dense, subangular, calcareous; a little silt; trace of gravel.

coarse, dense to very dense, subangul-
lar, calcareous; a little silt; trace
of gravel.

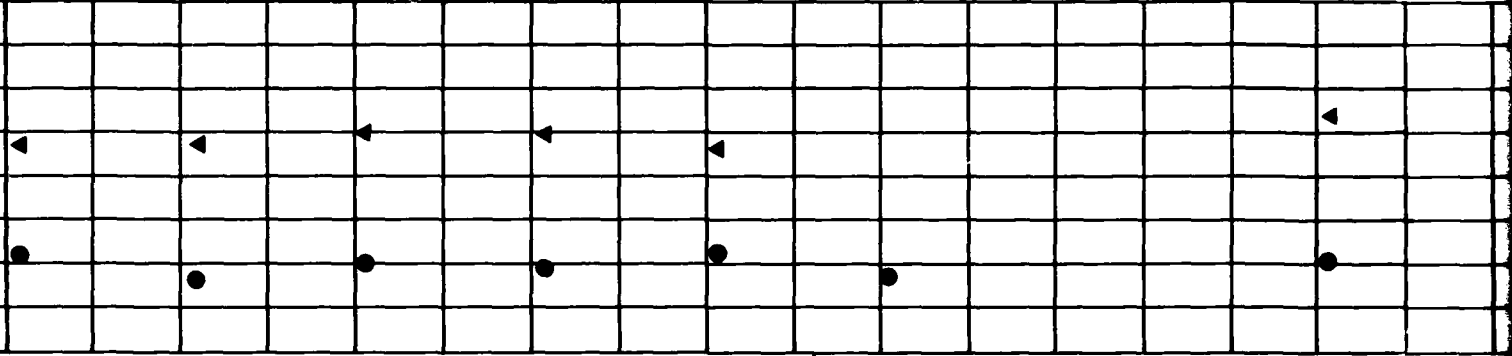
BIOTITE QUARTZ DIORITE, white, holo-
crystalline, medium grained allotrio-
morphic granular, fractured.

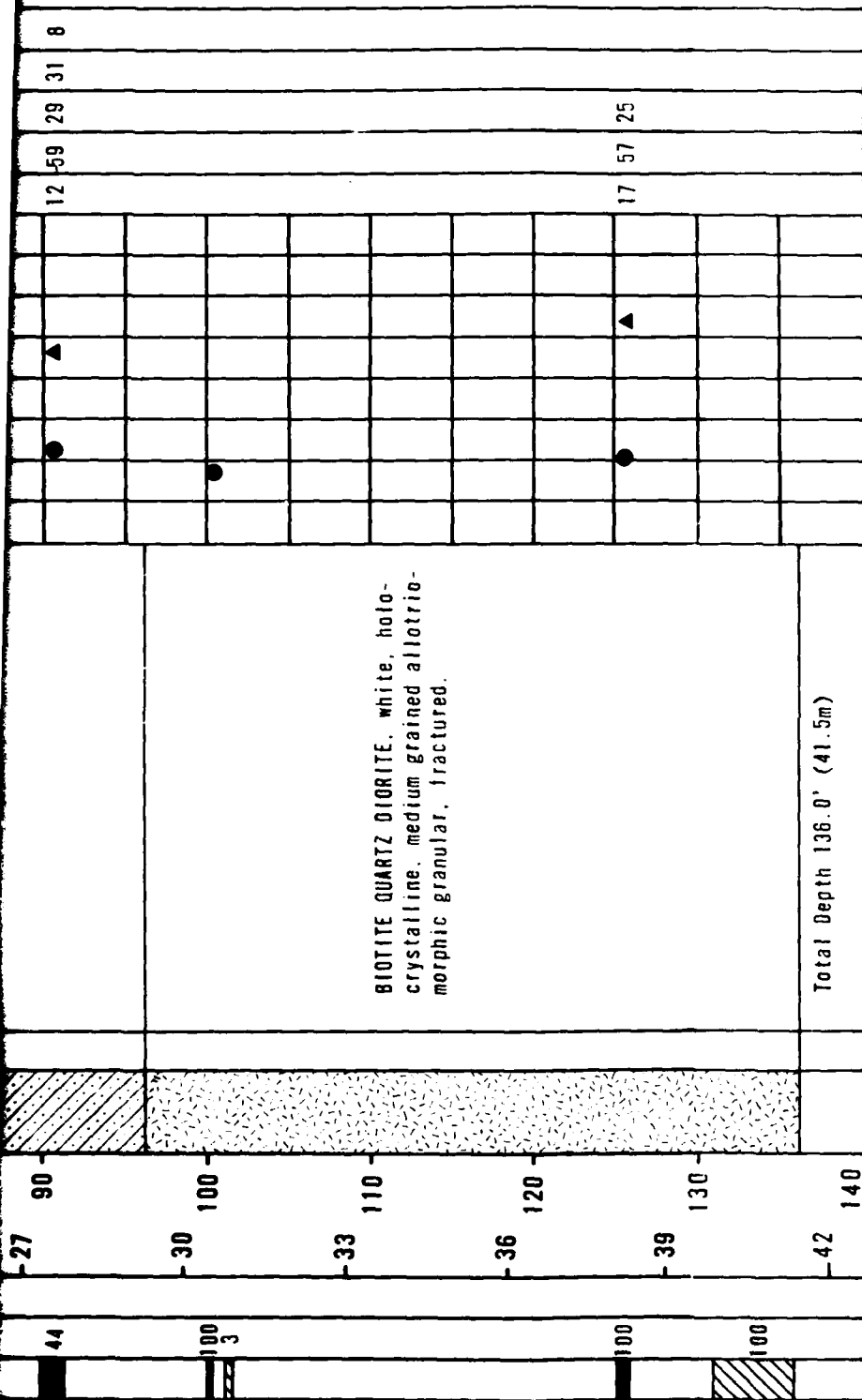
SC

15 50
18 60
21 70
24 80
27 90
30 100
33 110
36 120
39 130

80
93
100
80
44
100
3
100
100

43 65 22 38 18
1 56 43 27 8
12 59 29 31 8
17 57 25





SAMPLE TYPES

STANDARD PENETRATION TEST

FUGRO DRIVE

BULK

PITCHER TUBE

CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 870' (265m)
 DATE DRILLED : 17 May-18 May 1977
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 7/8" (124mm)
 GEOPHYSICAL LOGS : NatG, NN, NG, GG, GM
 CASING INSTALLED : 129' (39m)
 WATER LEVEL : 125' (38m)

LOG OF BORING LD-B-1
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS

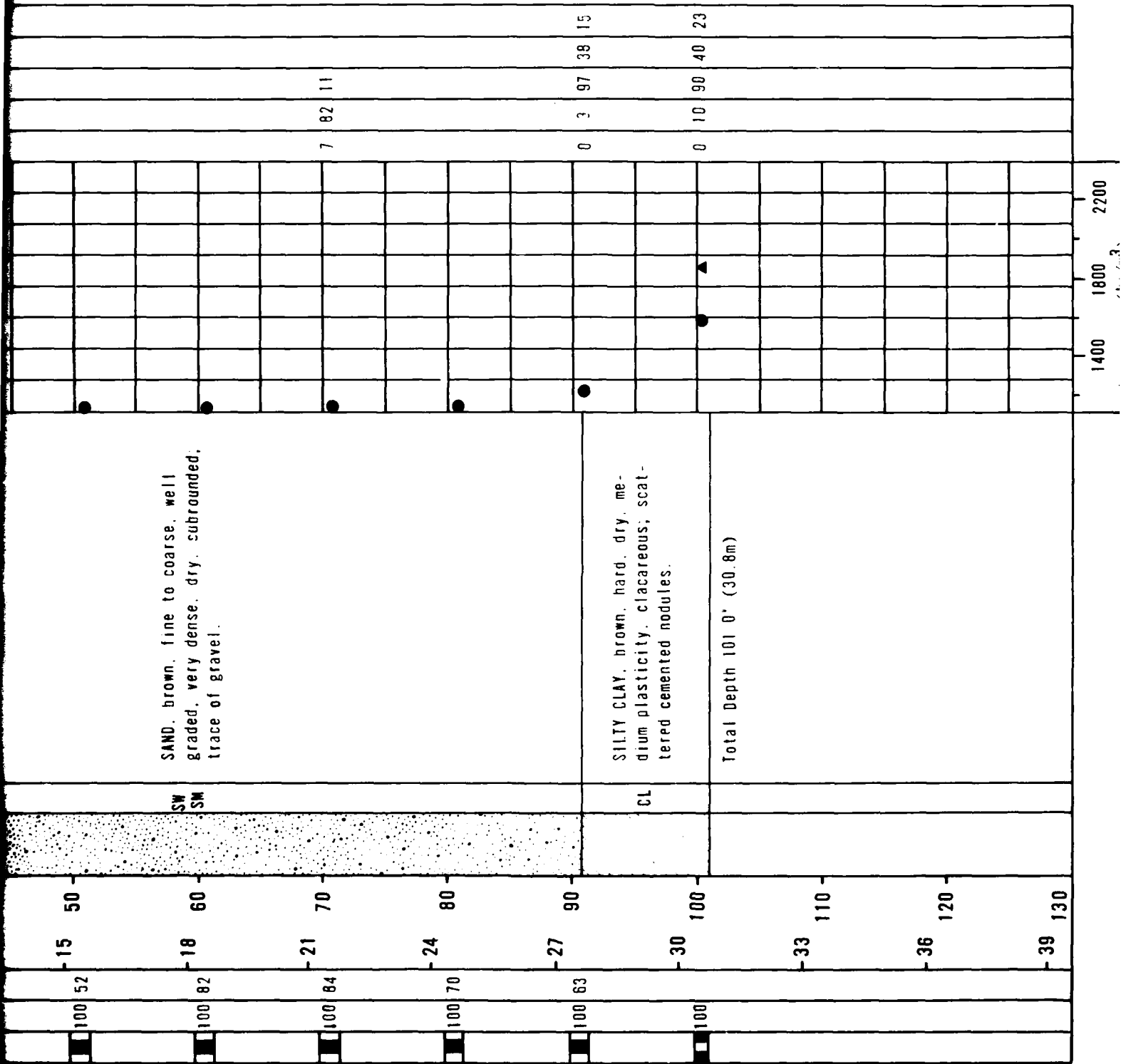
FIGURE
 C-14

FUGRO NATIONAL, INC.

See pages C-1 to C-4 for explanation of logs

3

[illegible]



AD-A113 450

FUGRO NATIONAL INC. LONG BEACH CA

F/G B/13

MX SITING INVESTIGATION. GEOTECHNICAL EVALUATION OF LUKE BOMBIN--ETC(U)

JAN 78

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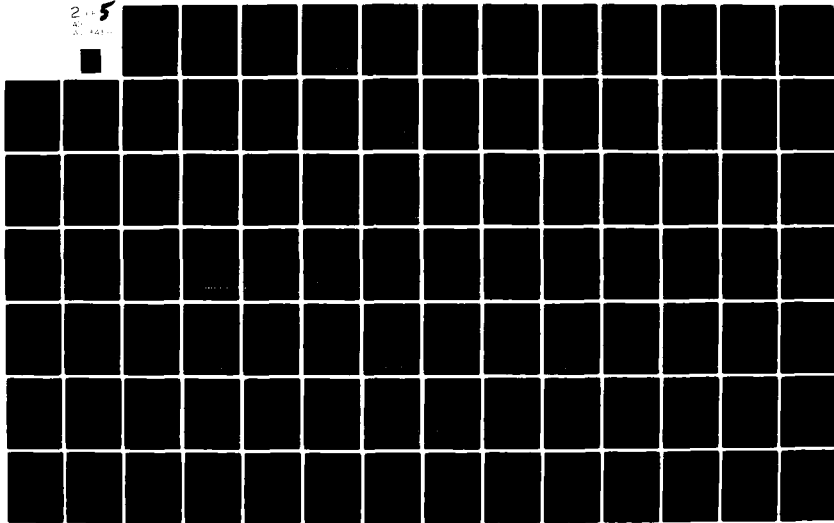
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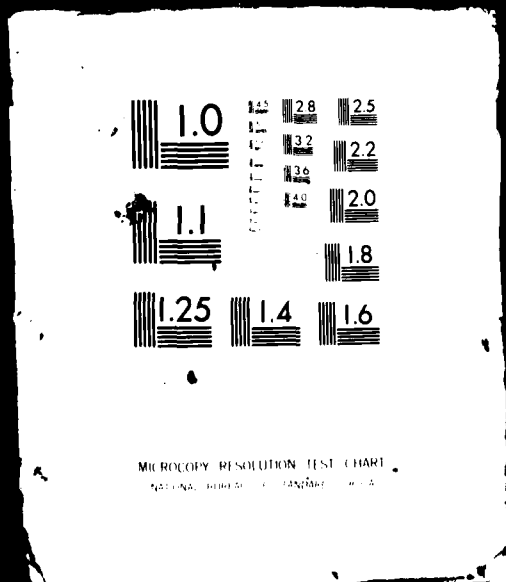
FN-TR-19D-VOL-4-APP-C/D

2 of 5

2 of 5



2 OF 5
AD-
A113450



0	3	97	38	15
SILTY CLAY, brown, hard, dry, me-				
90	83	100		
2				

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION
	30		0	0		SW SM	SAND, light brown, fine to coarse, well graded, loose, dry, subrounded, calcareous; trace of gravel.
	NR		3	10			
	100	77					
	100	R					
	100	R	6	20			
	100	R	9	30			
	100	R	12	40		SM	SILTY SAND, light brown, fine to coarse, well graded, very dense, dry, subrounded, calcareous; some gravel and friable sandstone; auger refusal at 72.5' (22.1m).
	100	R	15	50			

coarse, well graded, very dense, dry,
subrounded, calcareous; some gravel
and friable sandstone; auger refusal
at 72.5' (22.1m).

SM

Total Depth 72.5' (22.1m)

-12 40-

-15 50-

-18 60-

-21 70-

-24 80-

-27 90-

-30 100-

-33 110-

-36 120-

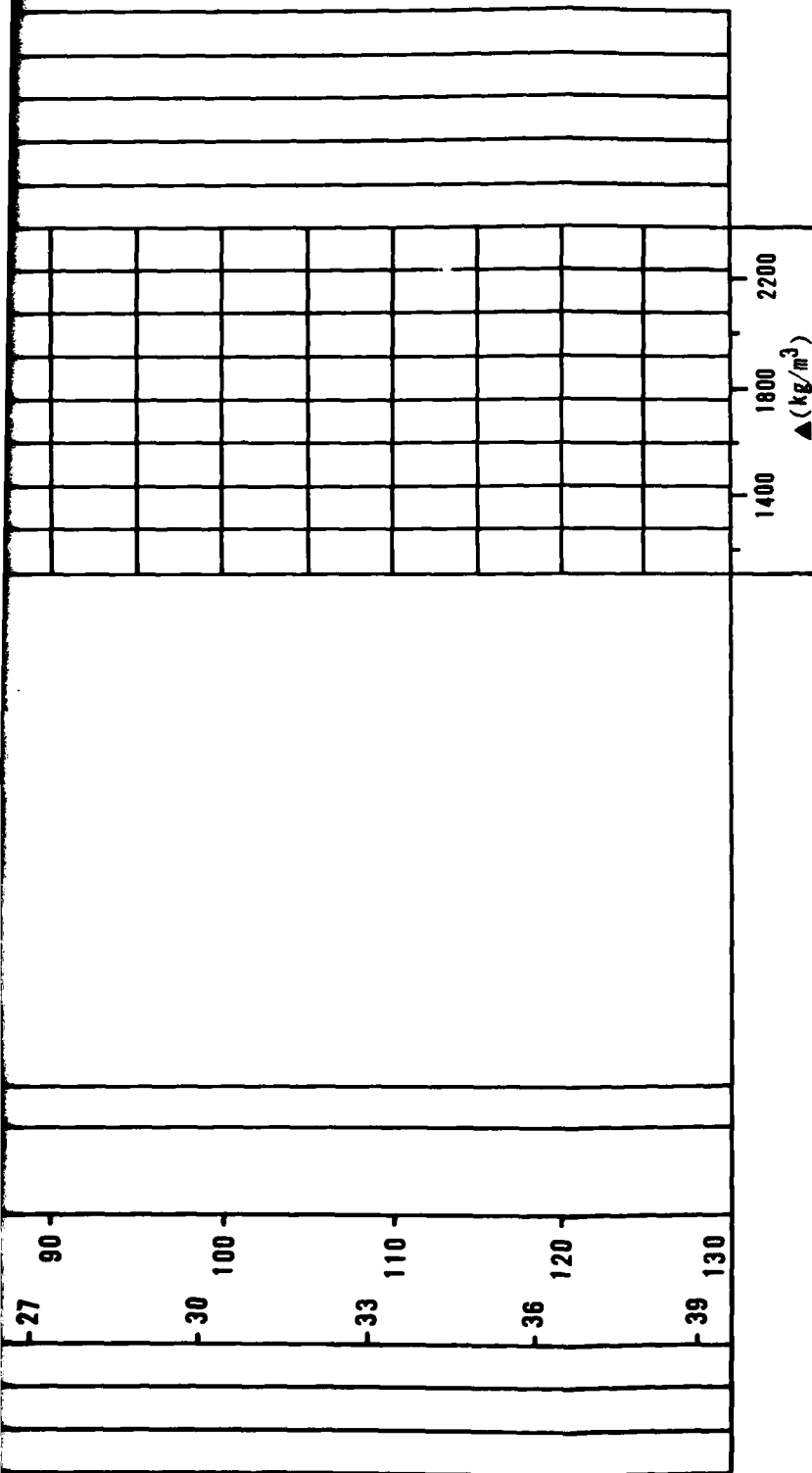
100 R

100 R

100 R

100 R

2



SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 650' (198m)

DATE DRILLED : 25 April 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

GEOPHYSICAL LOGS : None

CASING INSTALLED : None

WATER LEVEL : Not Apparent

LOG OF BORING LD-B-3
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-16

FUGRO NATIONAL INC.

[illegible]

SILTY SAND, gray, fine to coarse,
well graded, very dense, dry, sub-
angular, calcareous; trace of
some gravel.

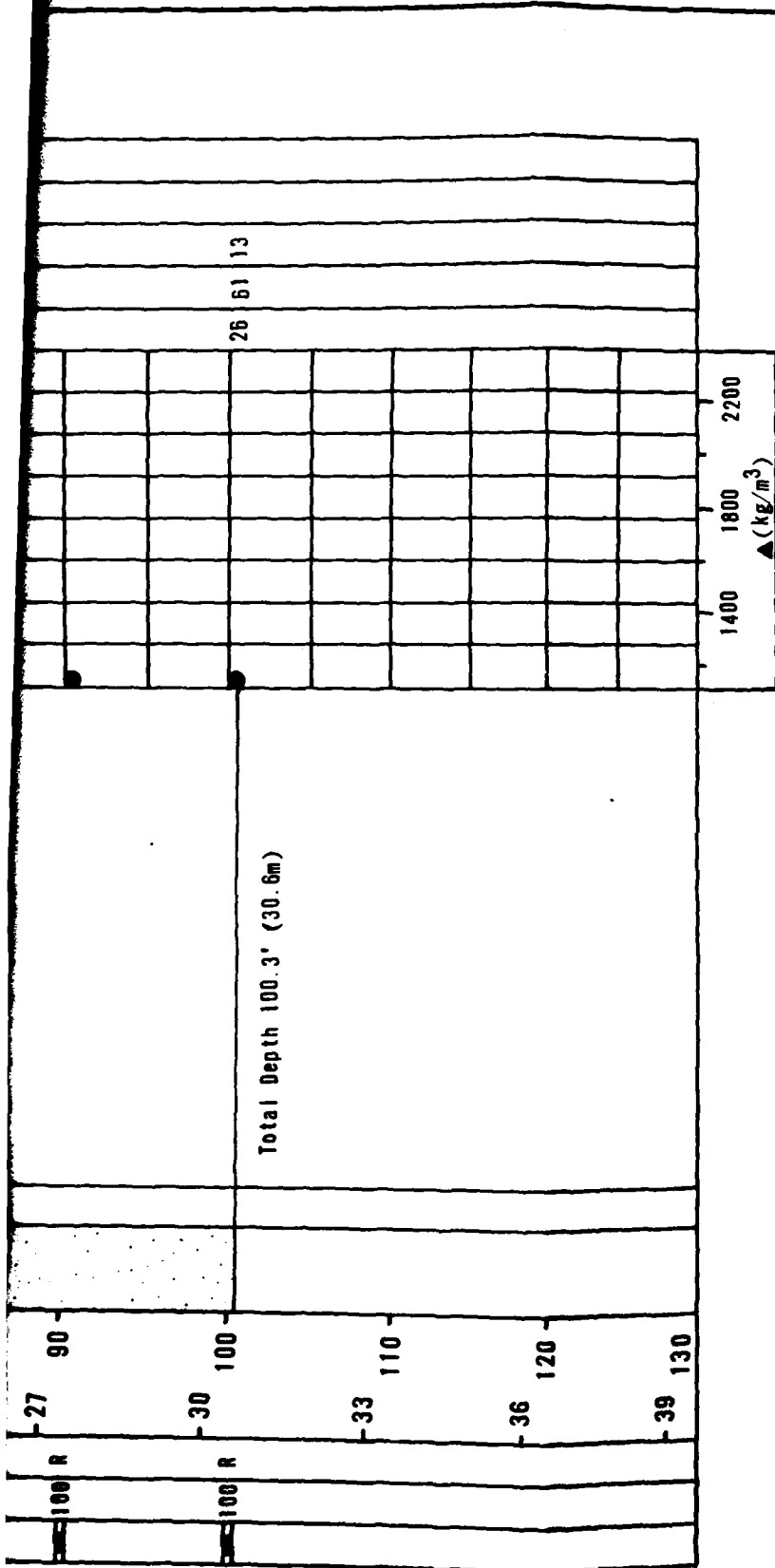
SM

Total Depth 100.3' (30.6m)

100 R	18	60
100 R	21	70
100 R	24	80
100 R	27	90
100 R	30	100
	33	110
	36	120
	39	130

26 61 13

1400 1800 2200
▲ (kg/m³)



SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 740' (226m)

DATE DRILLED : 26 April 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

GEOPHYSICAL LOGS : Calp, NatG, NN, NG, GG, GM

CASING INSTALLED : 82' (25m)

WATER LEVEL : Not Apparent

LOG OF BORING LD-8-4
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-17

FUGRO NATIONAL, INC.

See pages C-1 to C-4 for explanation of logs

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf)														SIEVE ANALYSIS				PI																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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SILTY SAND, light brown, fine to coarse, well graded, very dense, dry, subangular to subrounded, calcareous; scattered cemented nodules (3' to 13'); trace of gravel.

PROV.

CH BY

SILTY SAND, light brown, fine to coarse, well graded, very dense, dry, subangular to subrounded, calcareous; scattered cemented nodules (3' to 13'); trace of gravel.

SM

-15 50

100 R

-18 60

-21 70

100 R

-24 80

-27 90

-30 100

100 R

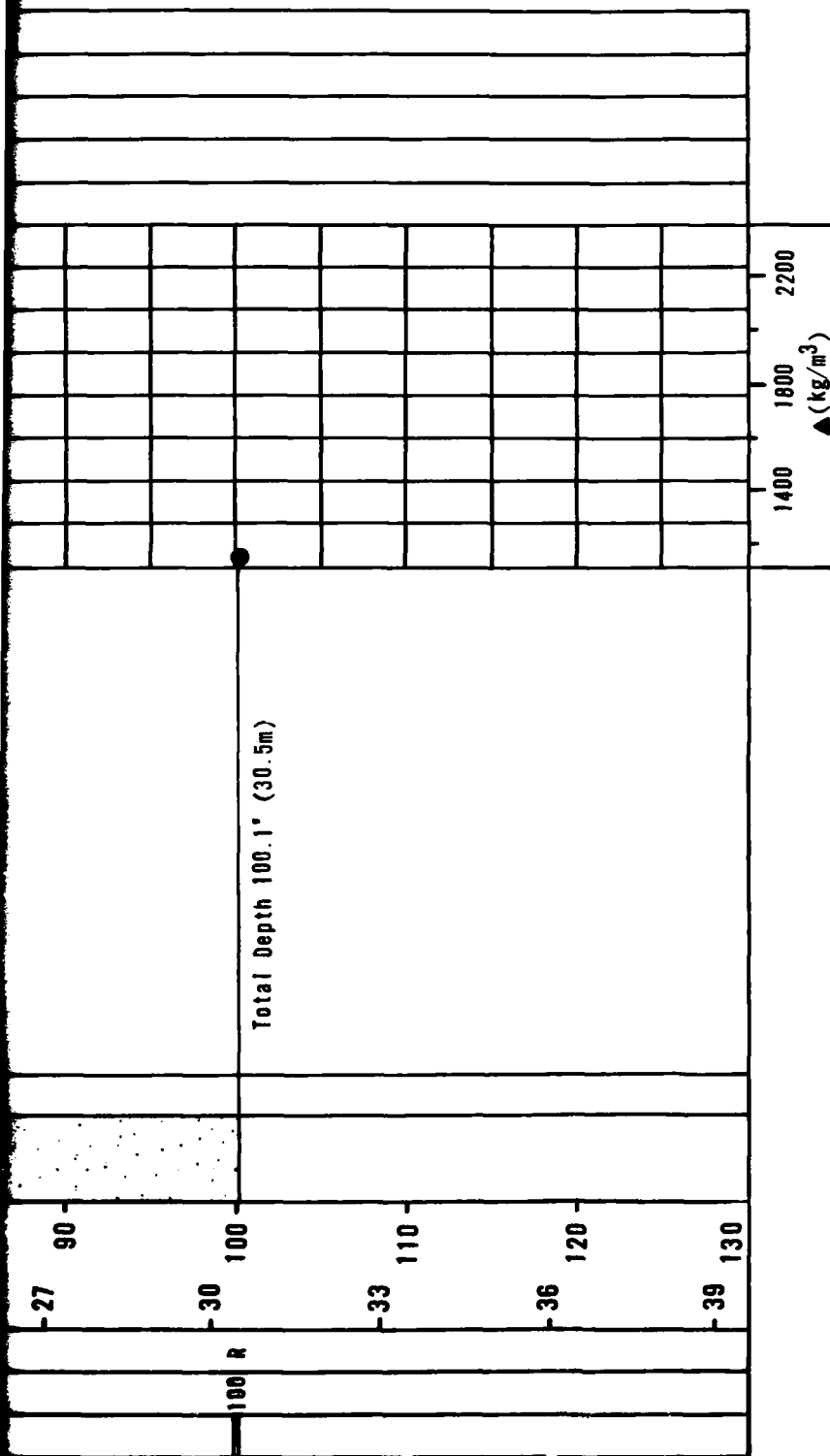
-33 110

-36 120

-39 130

Total Depth 100.1' (30.5m)

0 63 27



SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

Δ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 550' (168m)

DATE DRILLED : 27 April 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168m)

GEOPHYSICAL LOGS : None

CASING INSTALLED : None

WATER LEVEL : Not Apparent

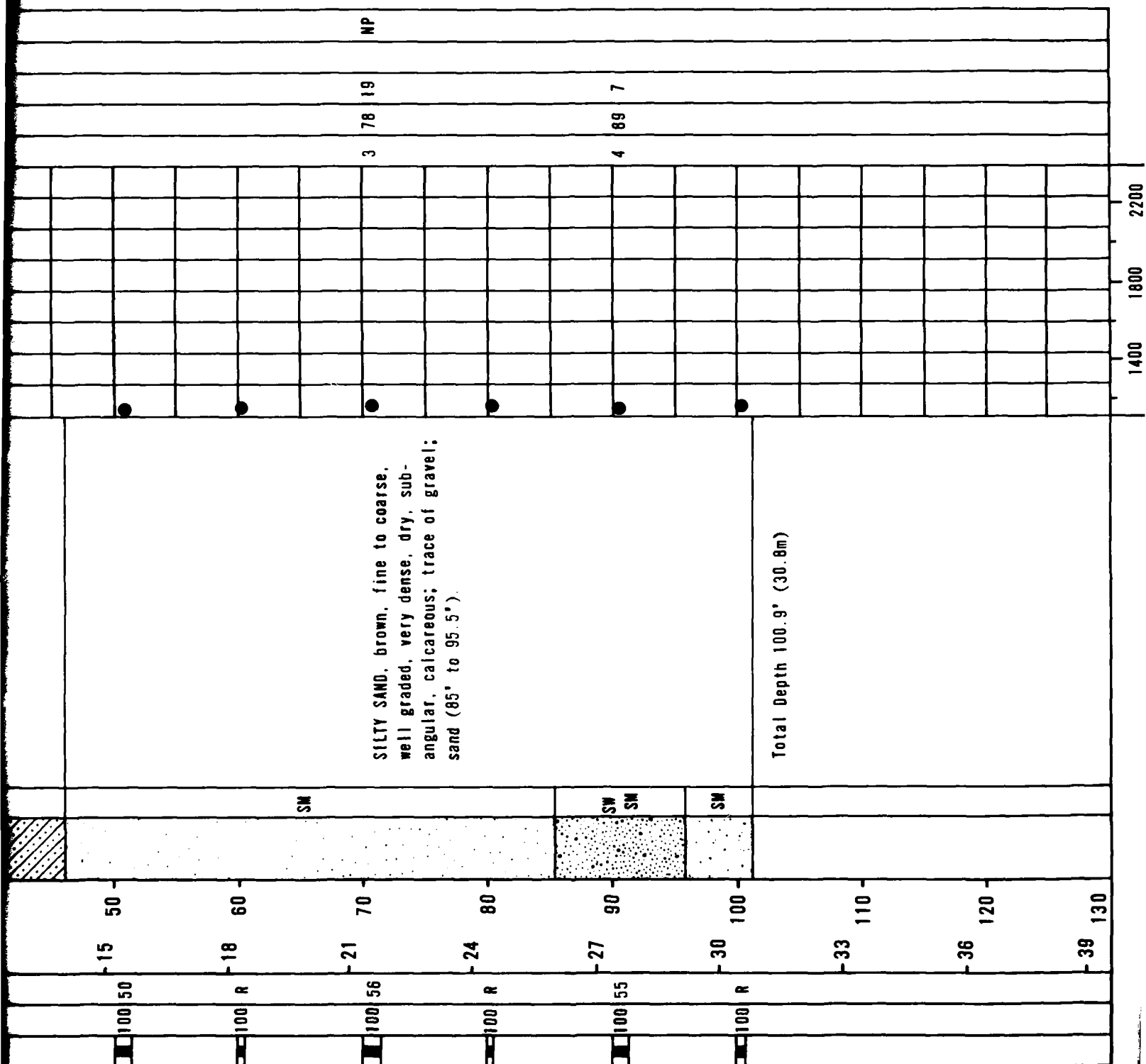
LOG OF BORING LD-B-5
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - "SAMSO"

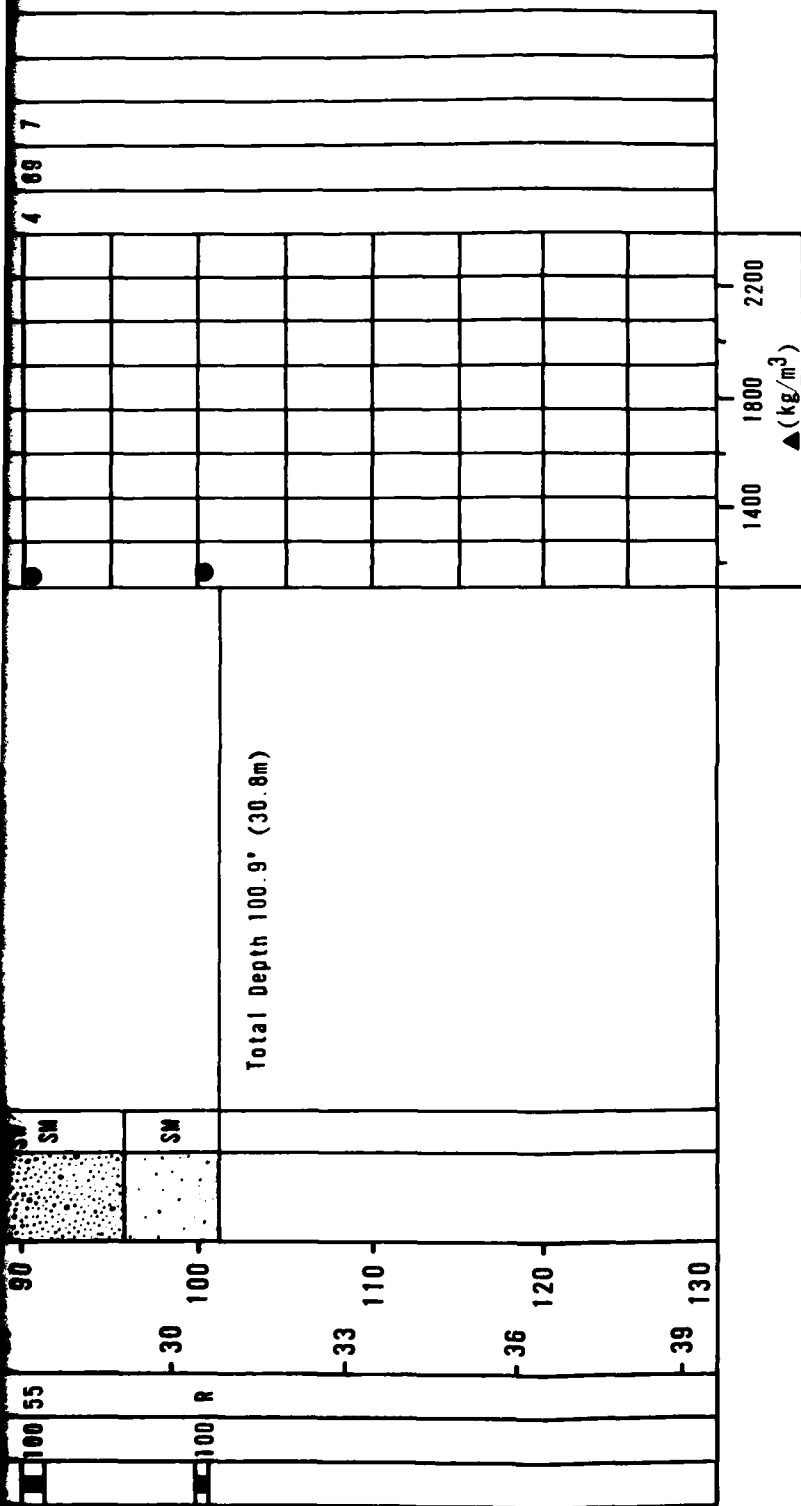
FIGURE
C-18

FUGRO NATIONAL INC.

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION
			0	0		SM	SILTY SAND, brown, fine to coarse, poorly graded, dry, subangular, cal- careous; trace of gravel.
	71 R		-3	10		CL	SILTY CLAY, brown, hard, dry, cal- careous; scattered cemented nodules; considerable fine to medium sand.
	100 R		-6	20		SC	
	82 R		-9	30		SM	CLAYEY SAND, brown, fine to coarse, well graded, very dense, dry, sub- angular, calcareous; some silt; trace of gravel; scattered cemented nodules (10.3' to 25.5'); silty sand (25.5' to 31").
	100 70		-12	40		SC	
	100 95		-15	50			
	100 50						



2



SAMPLE TYPES

□ STANDARD PENETRATION TEST

■ FUGRO DRIVE

□ BULK

■ PITCHER TUBE

ENGINEERING PARAMETERS

- N - STANDARD PENETRATION TEST (ASTM: D-1586-67)
 R - N VALUE GREATER THAN 100 BLOWS/FOOT
 ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
 ● - MOISTURE CONTENT (ASTM: D-2216-71)
 NR - NO RECOVERY

BORING DETAILS

ELEVATION : 790' (241m)
 DATE DRILLED : 4 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS : None
 CASING INSTALLED : None
 WATER LEVEL : Not Apparent

LOG OF BORING LD-B-6
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-19

FUGRO NATIONAL, INC.

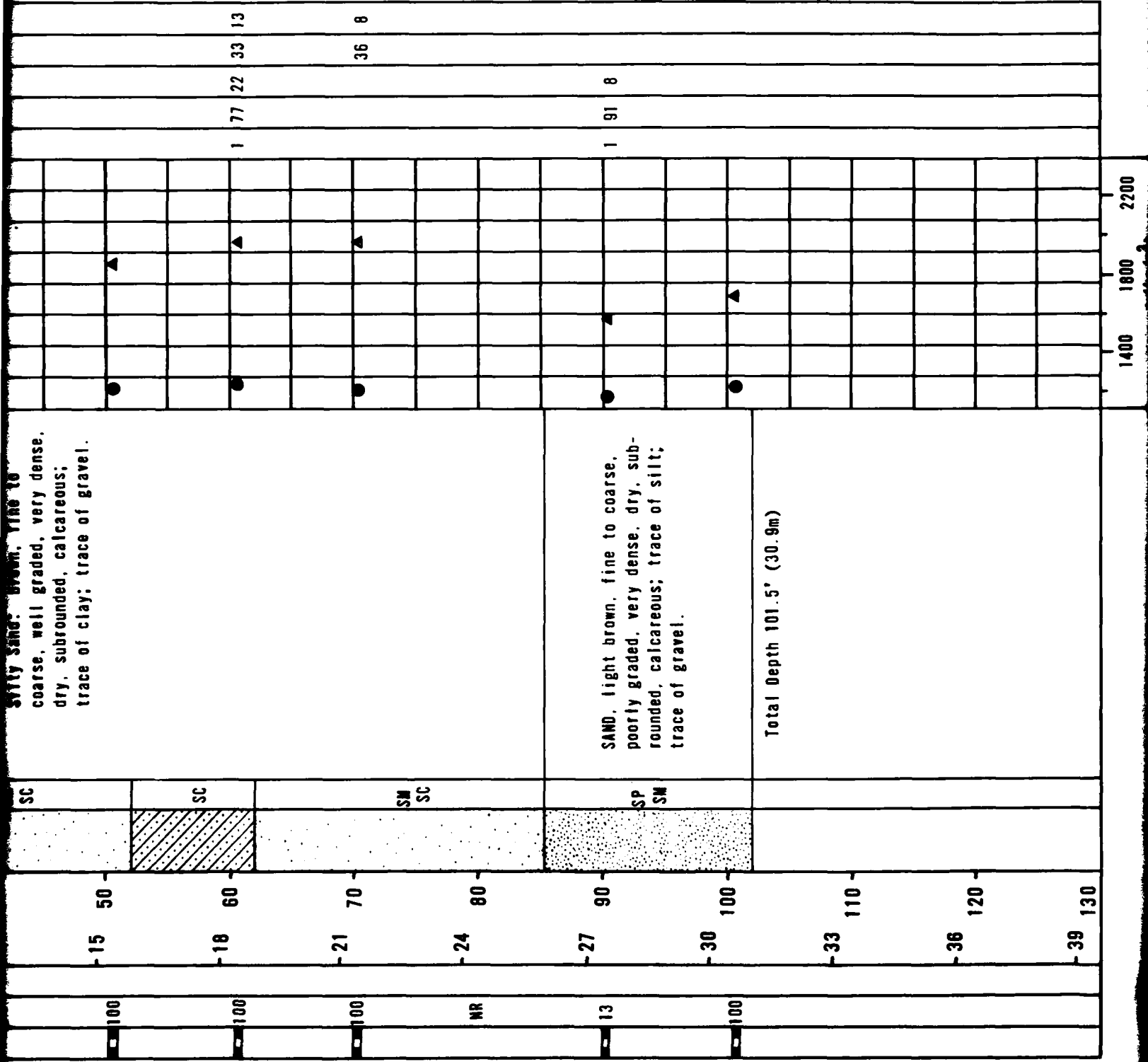
See pages C-1 to C-4 for explanation of logs

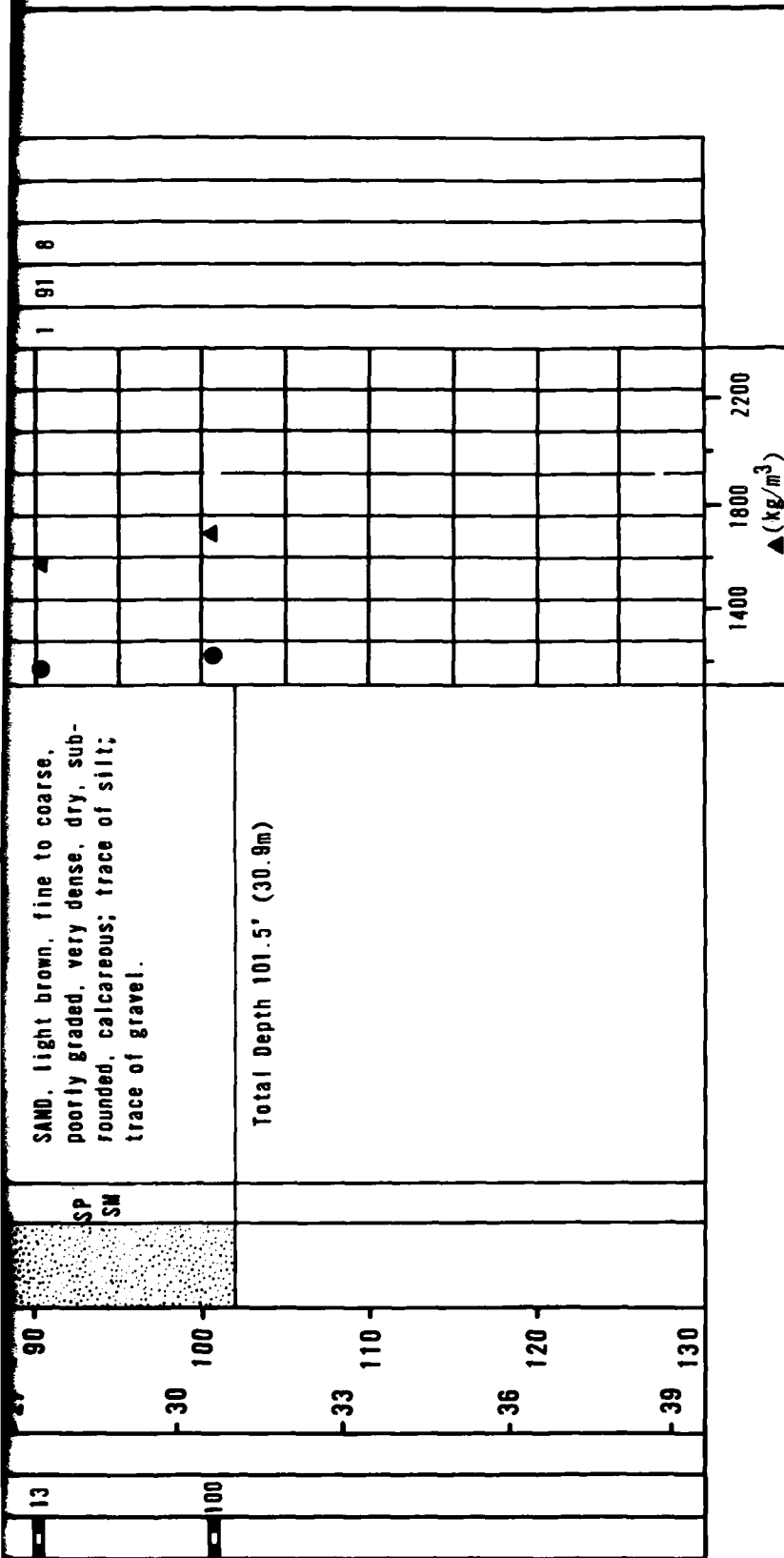
SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION
	100		0	0		SM	SILTY SAND, light brown, fine to coarse, loose, dry, subrounded, calcareous; trace of gravel.
			-3	10		SC	
	100		-6	20		SM SC	CLAYEY SAND AND SILTY SAND Inter-bedded. Clayey Sand: brown, fine to coarse, well graded, very dense, dry, subrounded, calcareous; some silt (1' to 11'; 25.5' to 35'); a little silt (52' to 62'); trace of gravel.
			-9	30		SC	
	100		-12	40		SM SC	Stilty Sand: brown, fine to coarse, well graded, very dense, dry, subrounded, calcareous; trace of clay; trace of gravel.
			-15	50		SC	

Silty sand: brown, fine to coarse, well graded, very dense, dry, subrounded, calcareous; trace of clay; trace of gravel.

SAND, light brown, fine to coarse, poorly graded, very dense, dry, subrounded, calcareous; trace of silt; trace of gravel.

Total Depth 101.5' (30.9m)





SAMPLE TYPES

□ STANDARD PENETRATION TEST

■ FUGRO DRIVE

□ BULK

■ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 710' (216m)
 DATE DRILLED : 5 May-6 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS : Calp, NatG, NN, NG, GG, GM
 CASING INSTALLED : 94' (29m)
 WATER LEVEL : Not Apparent

LOG OF BORING LD-8-7
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-20

FUGRO NATIONAL INC.

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION
67	62		0	0	SM	SM	SILTY SAND, light brown, fine to coarse, loose, dry, subrounded, calcareous; trace of gravel.
100	100		3	10	SC	SC	
100	72					SM SC	CLAYEY SAND AND SILTY SAND Inter-bedded. Clayey Sand: brown, fine to coarse, well graded, very dense, dry, subrounded, calcareous; some silt (1' to 11"; 25.5' to 35'); a little silt (52' to 62"); trace of gravel. Silty Sand: brown, fine to coarse, well graded, very dense, dry, subrounded, calcareous; trace of clay; trace of gravel.
100	70		6	20		SM SC	
100			9	30	SC	SC	
100			12	40		SM SC	
100			15	50		SC	

dry, subrounded, calcareous,
some silt (1' to 11"; 25.5' to
35'); a little silt (52' to
62'); trace of gravel.

Silty Sand: brown, fine to
coarse, well graded, very dense,
dry, subrounded, calcareous;
trace of clay; trace of gravel.

SAND, light brown, fine, poorly
graded, very dense, dry, subrounded,
calcareous; trace of silt; silty
sand, fine to medium (99' to 101.5').

Total Depth 101.5' (30.9m)

SM
SC

SC

SM
SC

SP
SM

SM

15 50

18 60

21 70

24 80

27 90

30 100

33 110

36 120

39 130

R

R

R

R

R

R

100

100

67

80

87

87

NP

NP

7

29

93

71

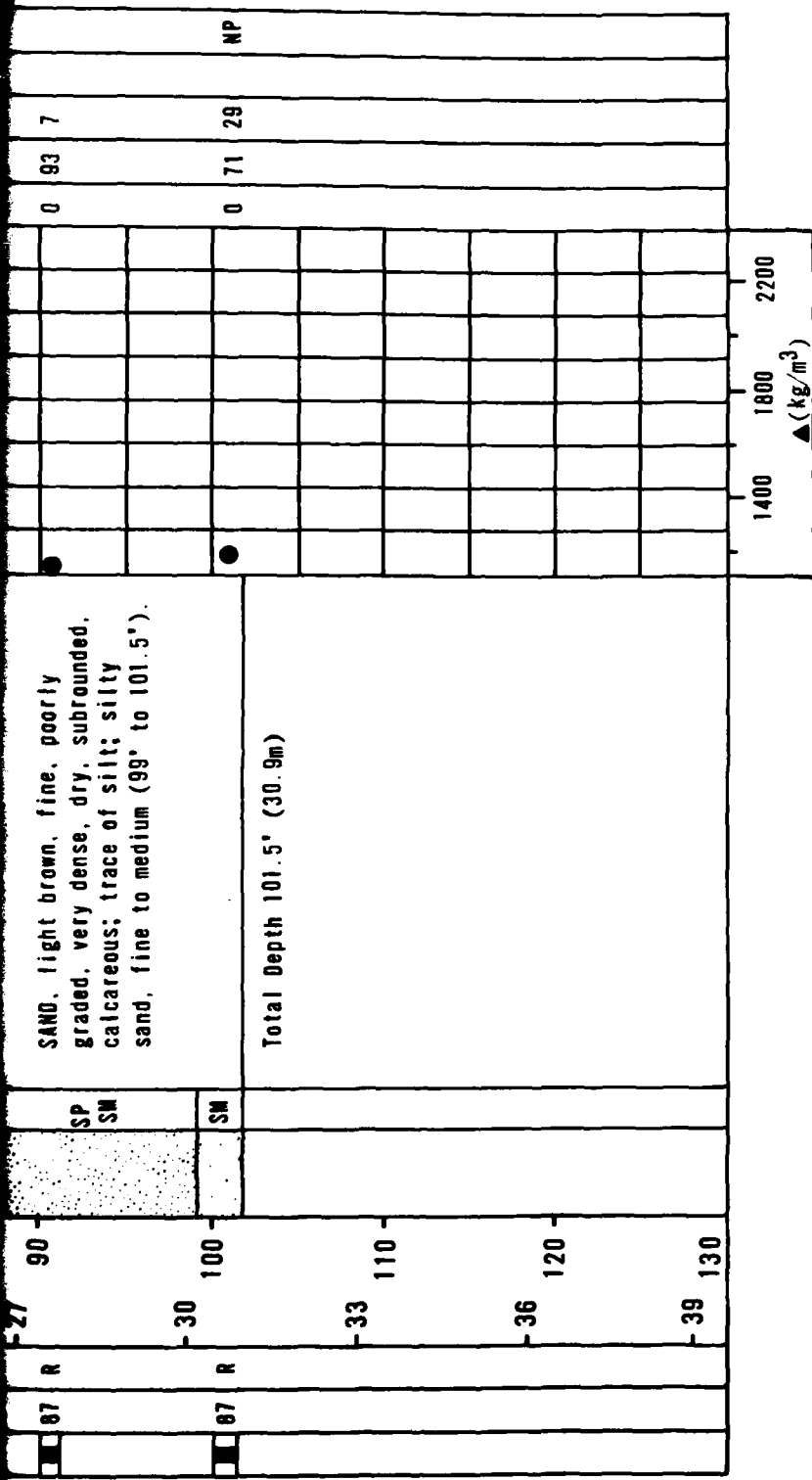
0

0

2200

1800

1400



SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

Δ - DRY UNIT WEIGHT (ASTM: D-2937-71)

\bullet - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 710' (216m)
 DATE DRILLED : 6 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS : Calp. NatG, NN, NG, GG, GM
 CASING INSTALLED : 91' (28m)
 WATER LEVEL : Not Apparent

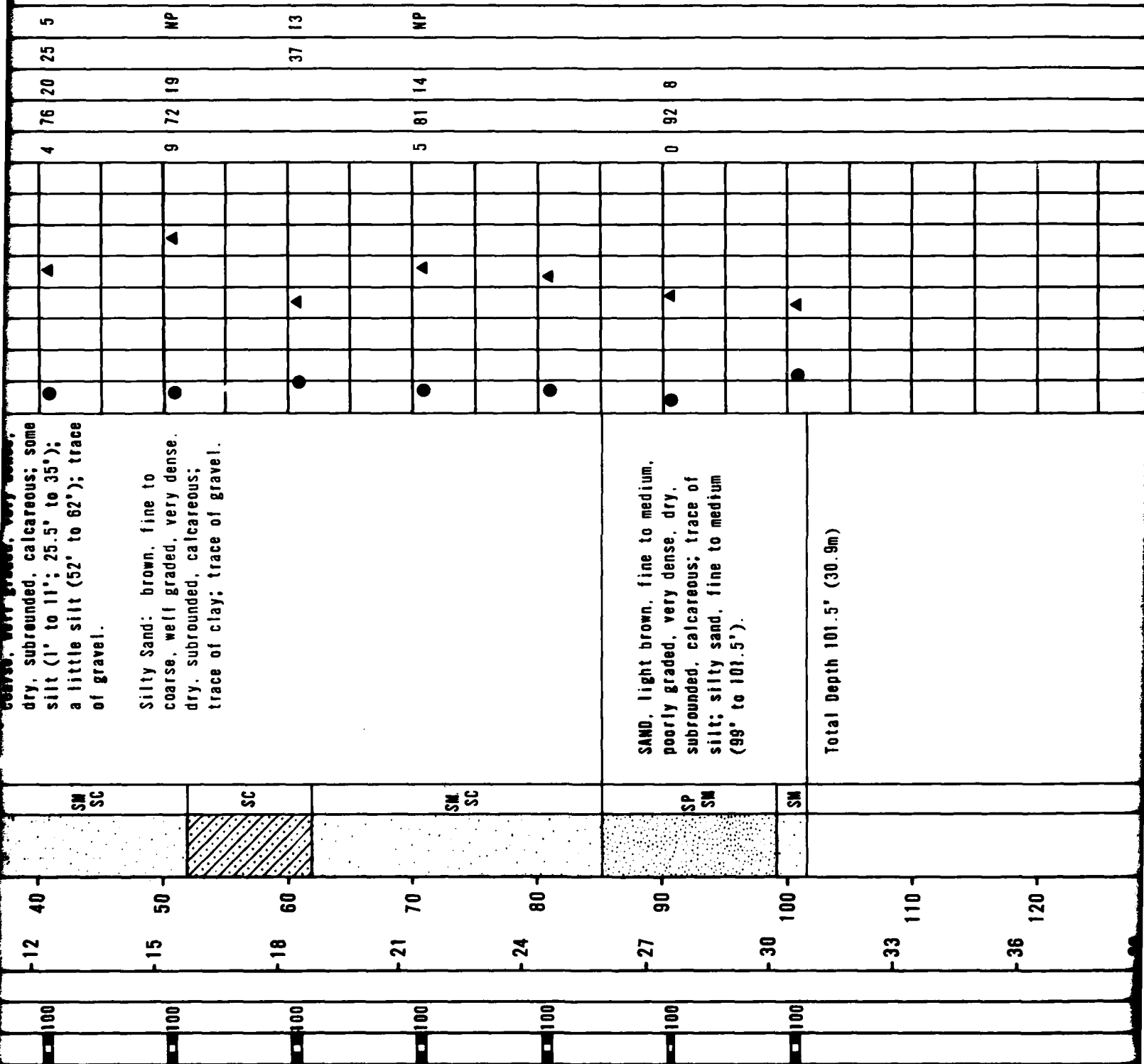
LOG OF BORING LD-B-8
 LECHUGUILLA DESERT, ARIZONA

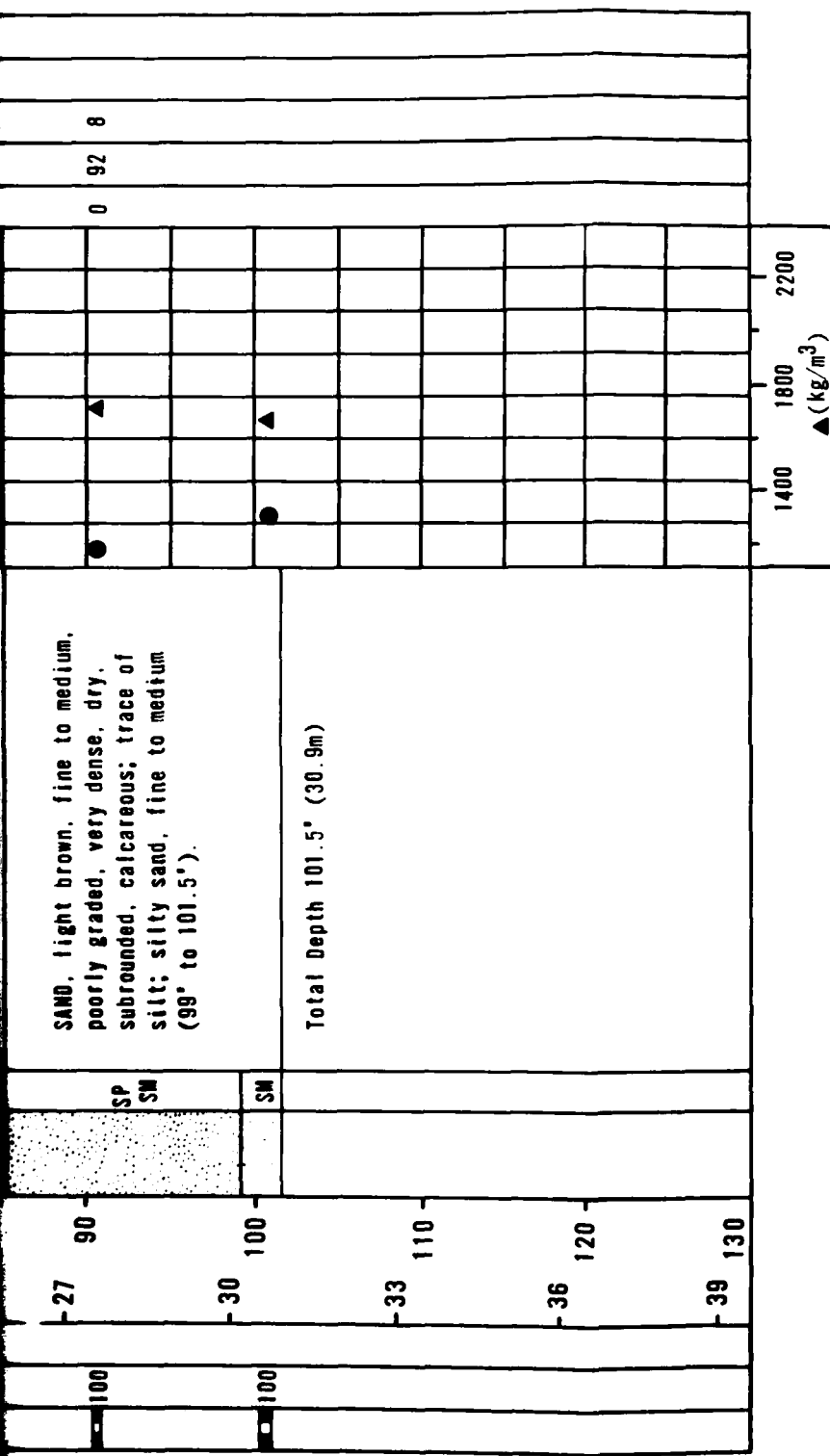
MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-21

FUGRO NATIONAL INC.

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION
-	-100	-	0	0	SM	SM	SILTY SAND, light brown, fine to coarse, loose, dry, subrounded, calcareous; trace of gravel.
-	-100	-	3	10	SC	SC	
-	-100	-	6	20	SW SC	SW SC	CLAYEY SAND and SILTY SAND Interbedded. Clayey Sand: brown, fine to coarse, well graded, very dense, dry, subrounded, calcareous; some silt (1' to 11'; 25.5' to 35'); a little silt (52' to 62'); trace of gravel.
-	-100	-	9	30	SC	SC	
-	-100	-	12	40	SW SC	SW SC	
-	-100	-	15	50	SC	SC	Silty Sand: brown, fine to coarse, well graded, very dense, dry, subrounded, calcareous; trace of clay; trace of gravel.





SAMPLE TYPES

STANDARD PENETRATION TEST

FUGRO DRIVE

BULK

PITCHER TUBE

ENGINEERING PARAMETERS

- N - STANDARD PENETRATION TEST (ASTM: D-1586-67)
- R - N VALUE GREATER THAN 100 BLOWS/FOOT
- ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
- - MOISTURE CONTENT (ASTM: D-2216-71)
- NR - NO RECOVERY

BORING DETAILS

ELEVATION : 710' (216m)
 DATE DRILLED : 6 May-7 May 1977
 DRILLING METHOD : Hollow Stem Auger
 HOLE DIAMETER : 6 5/8" (168mm)
 GEOPHYSICAL LOGS : Calp. NatG, NN, NG, GG, GM
 CASING INSTALLED : 92' (28m)
 WATER LEVEL : Not Apparent

LOG OF BORING LD-B-9
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-22

CHECKED BY _____

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf)										SIEVE ANALYSIS			
							80	90	100	110	120	130	140	GR	SA	FI	LL	PI		
	100		0		SM	SILTY SAND, light brown, fine to medium, very dense, dry, subrounded, calcareous; trace of gravel.	●			▲				0	73	2	32	15		
	100		3				●		▲											
	100		6		SC		●			▲				3	65	32	36	15		
	100		9				●							2	78	20	35	13		
	67		12		SM	CLAYEY SAND and SILTY SAND Inter-bedded. Clayey Sand: light brown, fine to coarse, very dense, dry, subrounded, calcareous; some silt; trace of gravel. Silty Sand: light brown, fine to coarse, very dense, dry, subrounded, calcareous; trace of gravel.	●		▲											
	100		15		SC		●		▲											
	100		18				●													
	100		21		SM		●							1	79	20		NP		

DEPART

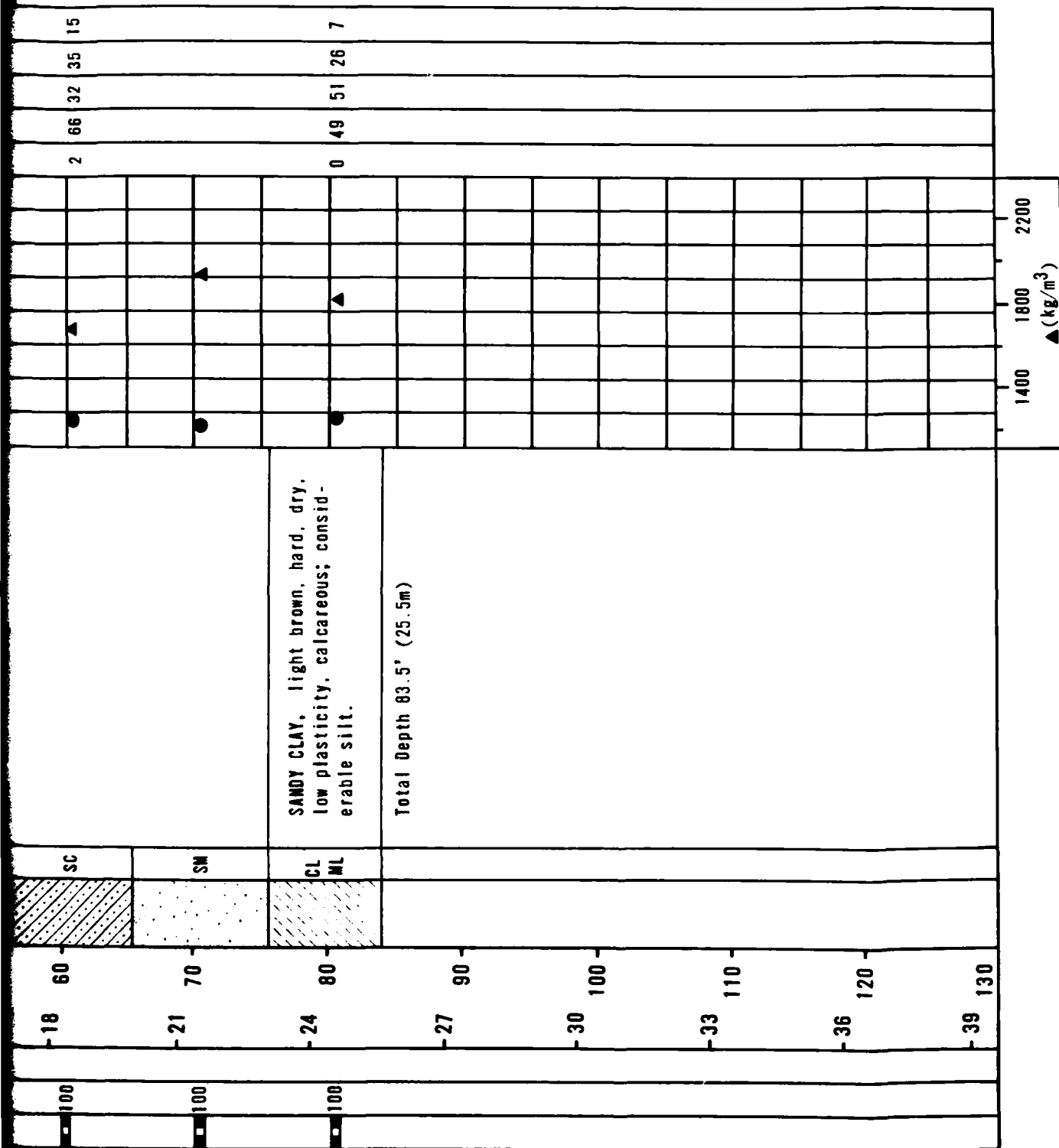
SAMPLE TYPES

☐ STANDARD PENETRATION TEST

BORING DETAILS

ELEVATION : 700' (213m)

DATE BORING : 8 Nov. 1977





SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

LOG OF BORING LD-8-10
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-23

FUGRO NATIONAL, INC.

BORING DETAILS

ELEVATION : 700' (213m)

DATE DRILLED : 8 May 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

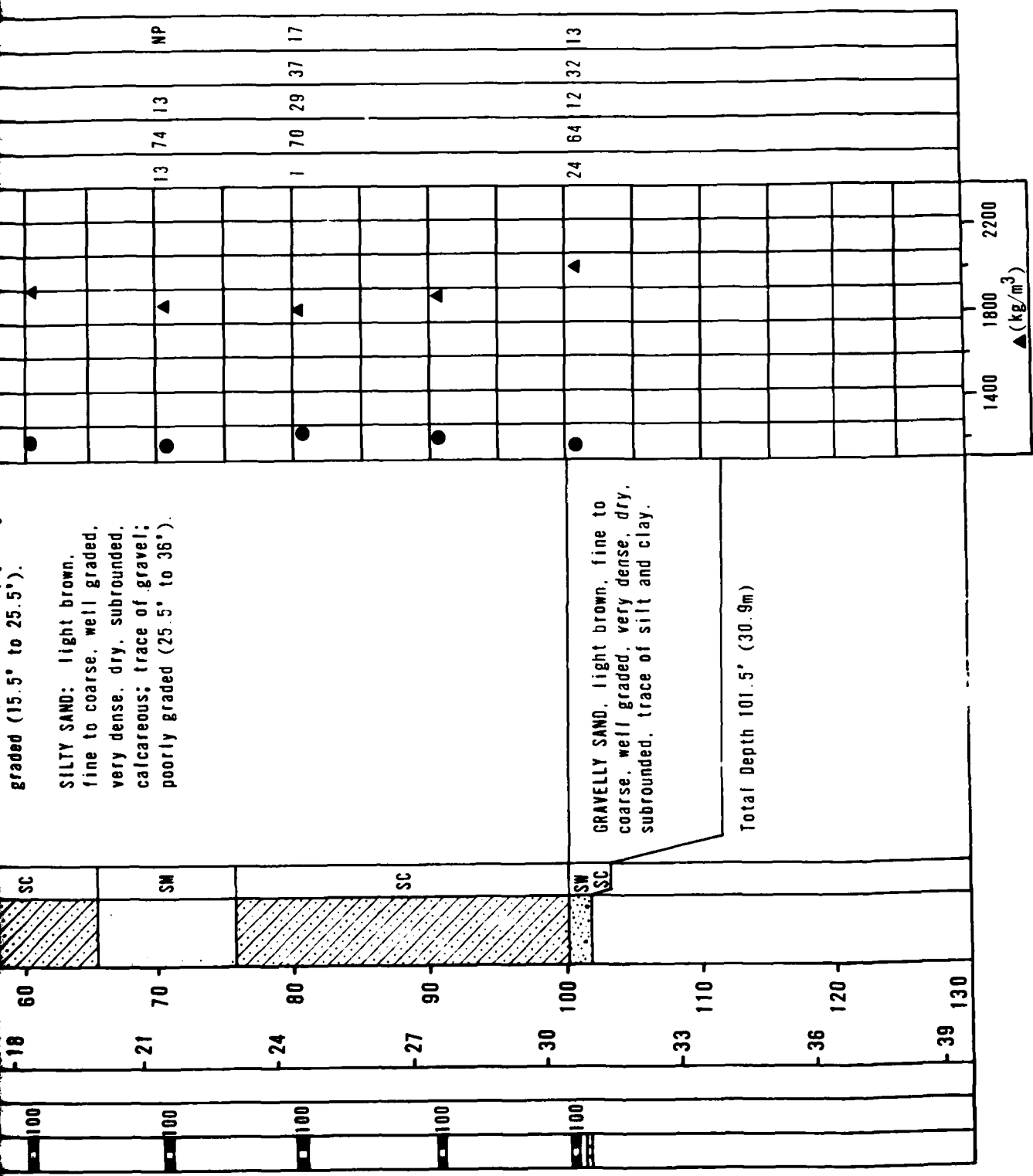
GEOPHYSICAL LOGS : None

CASING INSTALLED : None

WATER LEVEL : Not Apparent

See pages C-1 to C-4 for explanation of logs

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION
-	-	-	0	0		SM	SILTY SAND, light brown, fine to medium, loose, dry, subrounded, calcareous; trace of gravel.
-	100	-	3	10		SC	
-	100	-	6	20		SM	
-	100	-	9	30		SC	
-	67	-	12	40		SM	CLAYEY SAND and SILTY SAND Interbedded. Clayey Sand: light brown, fine to coarse, generally well graded, very dense, dry, subrounded, calcareous; trace of gravel; scattered cemented nodules (2" to 12.5"); poorly graded (15.5' to 25.5').
-	100	-	15	50		SC	
-	87	-	18	60		SM	
-	-	-	-	-		SC	



SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ EUGEN DRIVE

BORING DETAILS

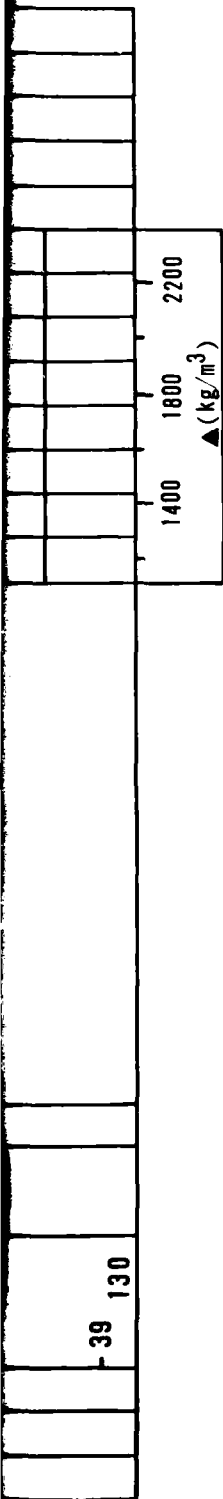
ELEVATION : 920' (280m)

DATE DRILLED : 9 May 1977

DRILLING METHOD : Hollow Stem Auger

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MX
DEPARTMENT



SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 920' (280m)

DATE DRILLED : 9 May 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

GEOPHYSICAL LOGS : None

CASING INSTALLED : None

WATER LEVEL : Not Apparent

LOG OF BORING LD-B-11
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-24

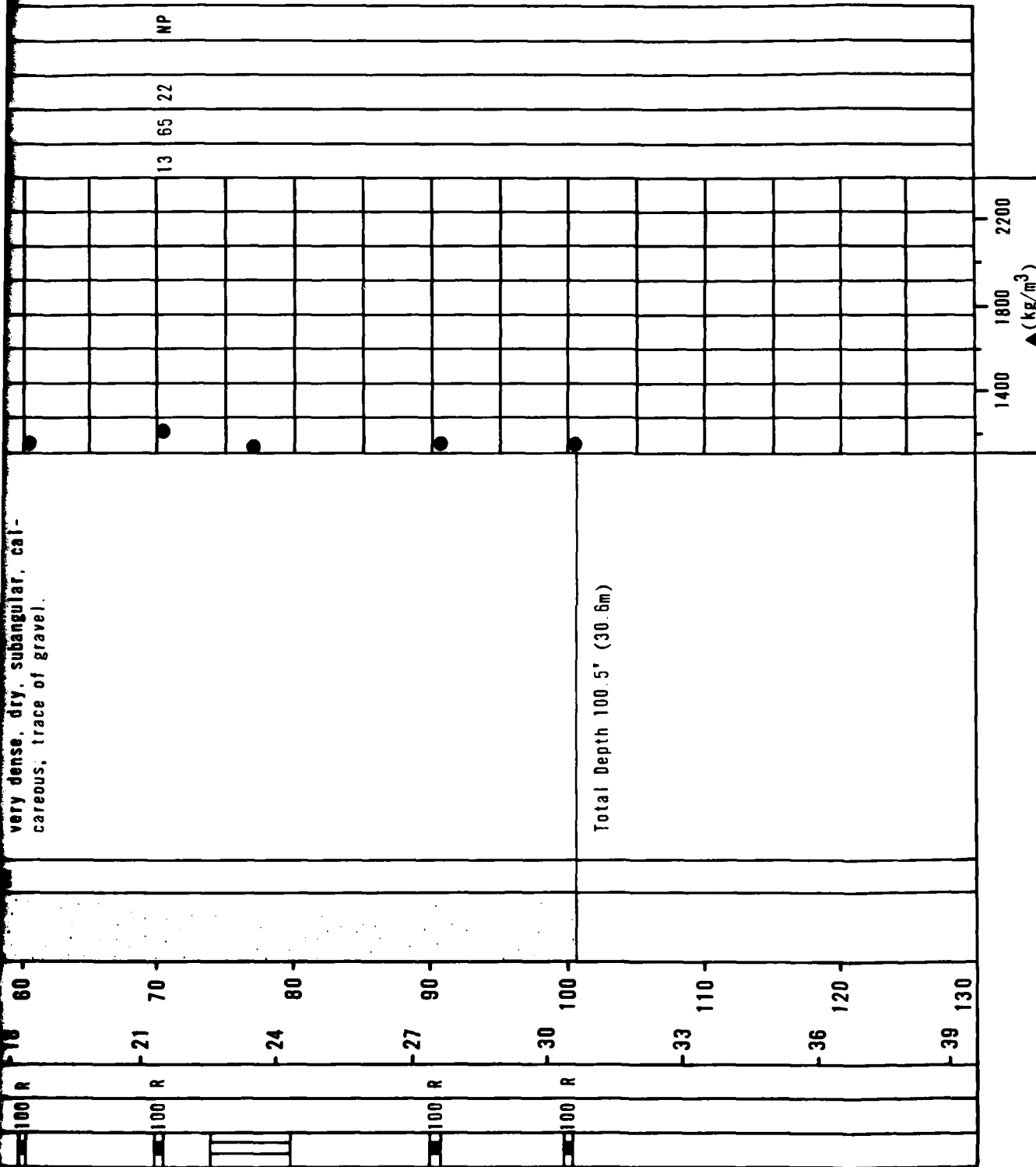
FUGRO NATIONAL, INC.

See pages C-1 to C-4 for explanation of logs

3

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH		LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf)											SIEVE ANALYSIS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
			METERS	FEET				80	90	100	110	120	130	140	GR	SA	FILL	PI																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	100		0	0		SM SC	SILTY SAND, light brown, fine to coarse, well graded, dry, subangular to subrounded, calcareous; trace of gravel; trace of clay.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												</

very dense, dry, subangular, calcareous; trace of gravel.



Total Depth 100.5' (30.6m)

SAMPLE TYPES

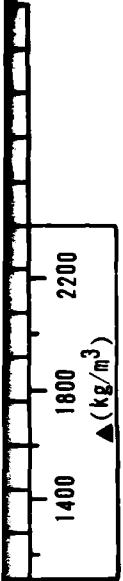
☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

BORING DETAILS

ELEVATION : 690' (210m)
 DATE DRILLED : 16 May-17 May 1977
 DRILLING METHOD : Hollow Stem Auger

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 DEPARTMENT



SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 690' (210m)

DATE DRILLED : 16 May-17 May 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

GEOPHYSICAL LOGS : None

CASING INSTALLED : None

WATER LEVEL : Not Apparent

LOG OF BORING LD-B-12
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-25

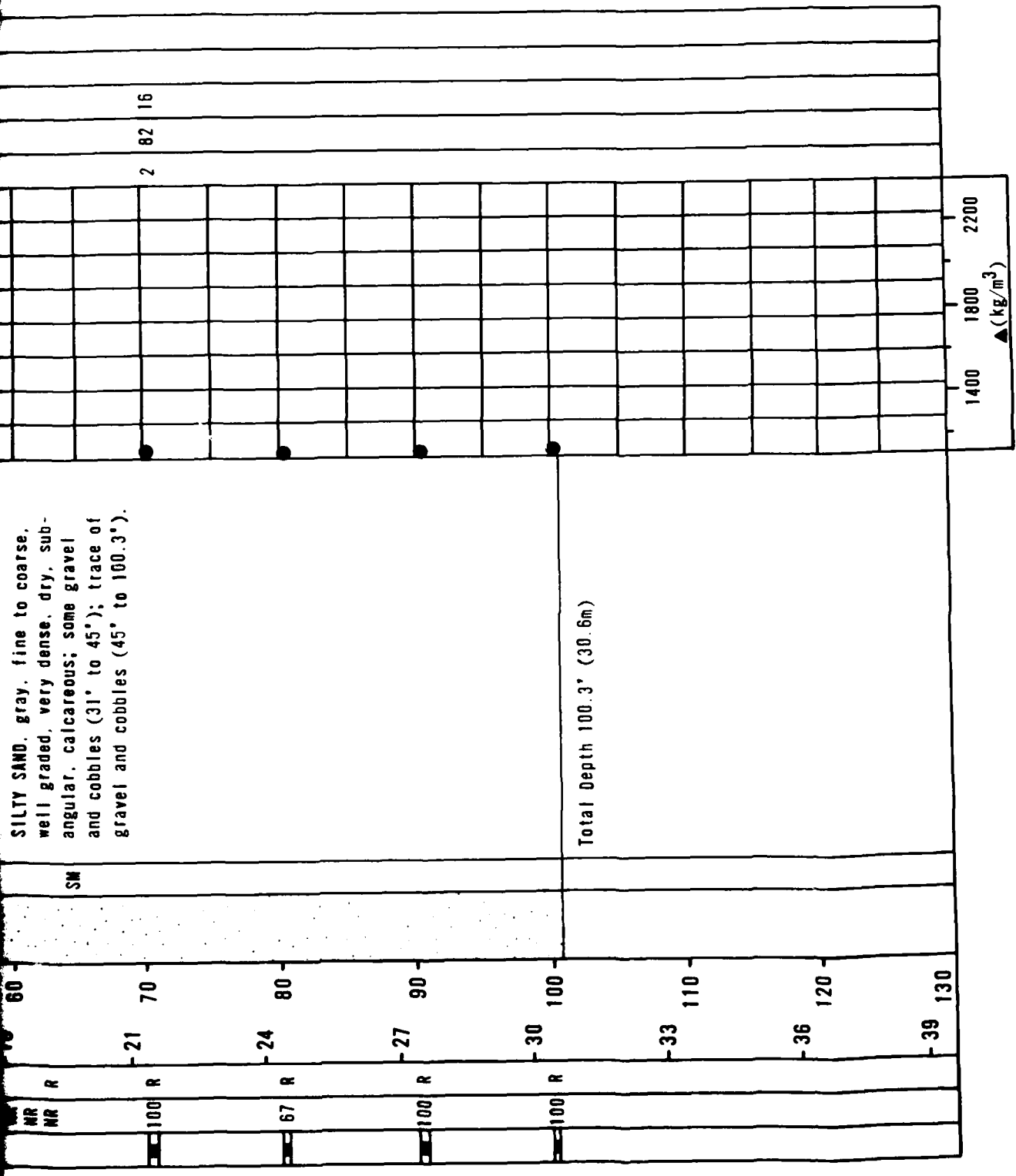
FUGRO NATIONAL, INC.

See pages C-1 to C-4 for explanation of logs

3

SOIL DESCRIPTION	▲ (pcf)															SIEVE ANALYSIS		
	80	90	100	110	120	130	140	● (%)							GR	SA	FI	
	5	10	15	20	25	30	35											
SILTY SAND, light brown, fine to coarse, loose, dry, subangular to subrounded, calcareous; some gravel; trace of cobbles.	●																	
	●														36	52	12	
	●														26	64	10	
	●															27	55	18
SANDY GRAVEL, brown, fine to coarse, poorly graded, very dense, dry, subangular to rounded, calcareous; some cobbles and boulders.	●																	
																54	36	10
SILTY SAND, gray, fine to coarse.	●																	

SILTY SAND, gray, fine to coarse, well graded, very dense, dry, sub-angular, calcareous; some gravel and cobbles (31' to 45'); trace of gravel and cobbles (45' to 100.3').



BORING DETAILS

ELEVATION : 620' (189m)
 DATE DRILLED : 17 May-18 May 1977
 DRILLING METHOD : Hollow Stem Auger

SAMPLE TYPES

☐ STANDARD PENETRATION TEST
☒ FUGRO DRIVE

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 DEPARTMENT

2

▲ (kg/m³)

SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☒ FUGRO DRIVE

☐ BULK

☒ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 620' (189m)

DATE DRILLED : 17 May-18 May 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

GEOPHYSICAL LOGS : Calp, NatG, NN, NG,
GG, GM

CASING INSTALLED : 82' (25m)

WATER LEVEL : Not Apparent

See pages C-1 to C-4 for explanation of logs

LOG OF BORING LD-B-13
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

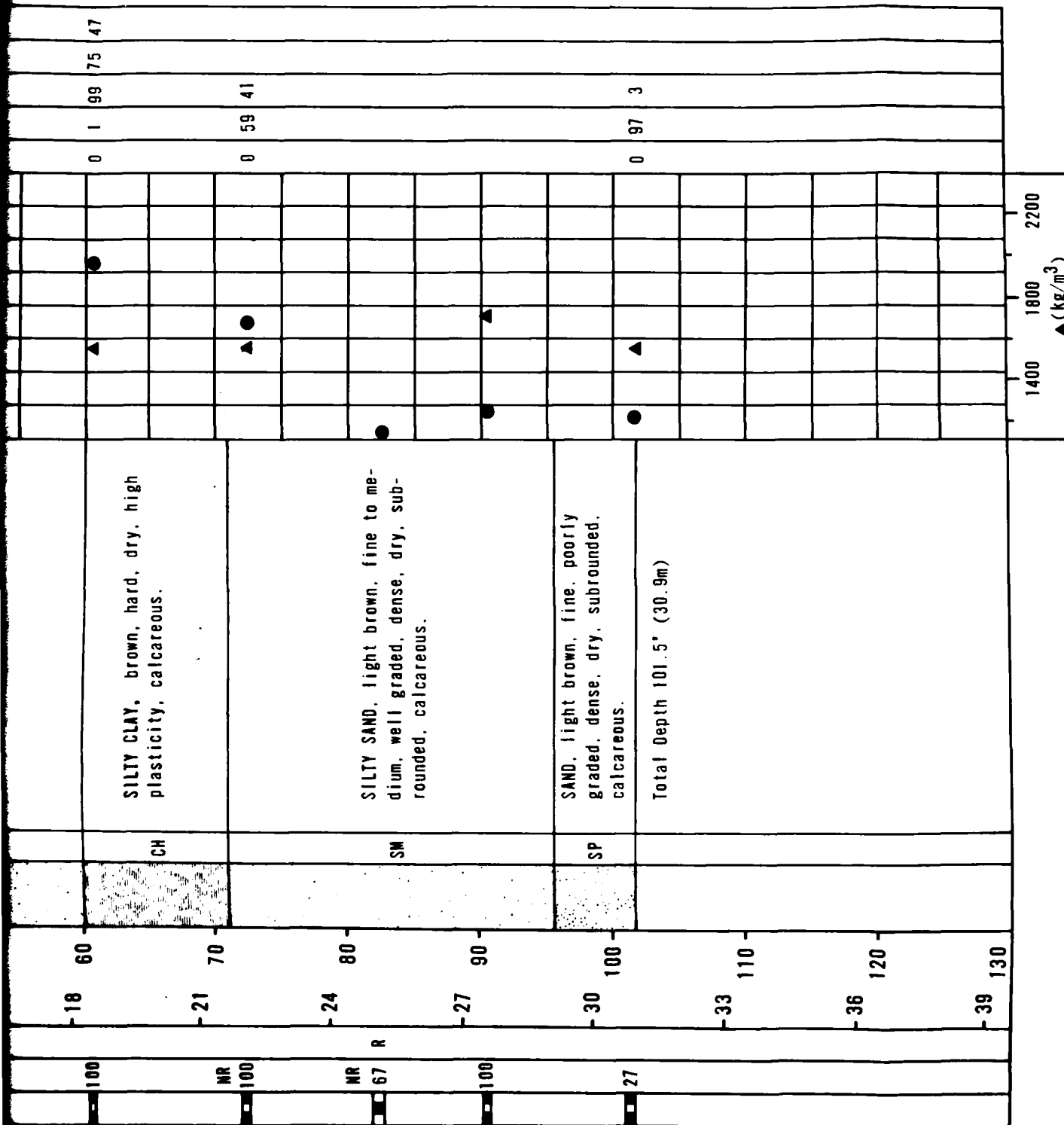
FIGURE
C-26

FUGRO NATIONAL, INC.

3

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	FEET	LITHOLOGY	USCS
NR	84	-0	0	0		SW SM
NR	100	-3	10			SM
NR	73 R	-6	20			SW SM
NR	100	-9	30			CH
NR	100	-12	40			SP
NR	100	-15	50			SM

BORING DETAILS



▲(kg/m³)

SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☒ FUGRO DRIVE

☐ BULK

☒ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 420' (128m)

DATE DRILLED : 18 May-24 May 1977

DRILLING METHOD : Hollow Stem Auger

HOLE DIAMETER : 6 5/8" (168mm)

GEOPHYSICAL LOGS : Calp, NatG, NN, NG,
GG, GM

CASING INSTALLED : 93' (28m)

WATER LEVEL : Not Apparent

See pages C-1 to C-4 for explanation of logs

LOG OF BORING LD-B-14
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

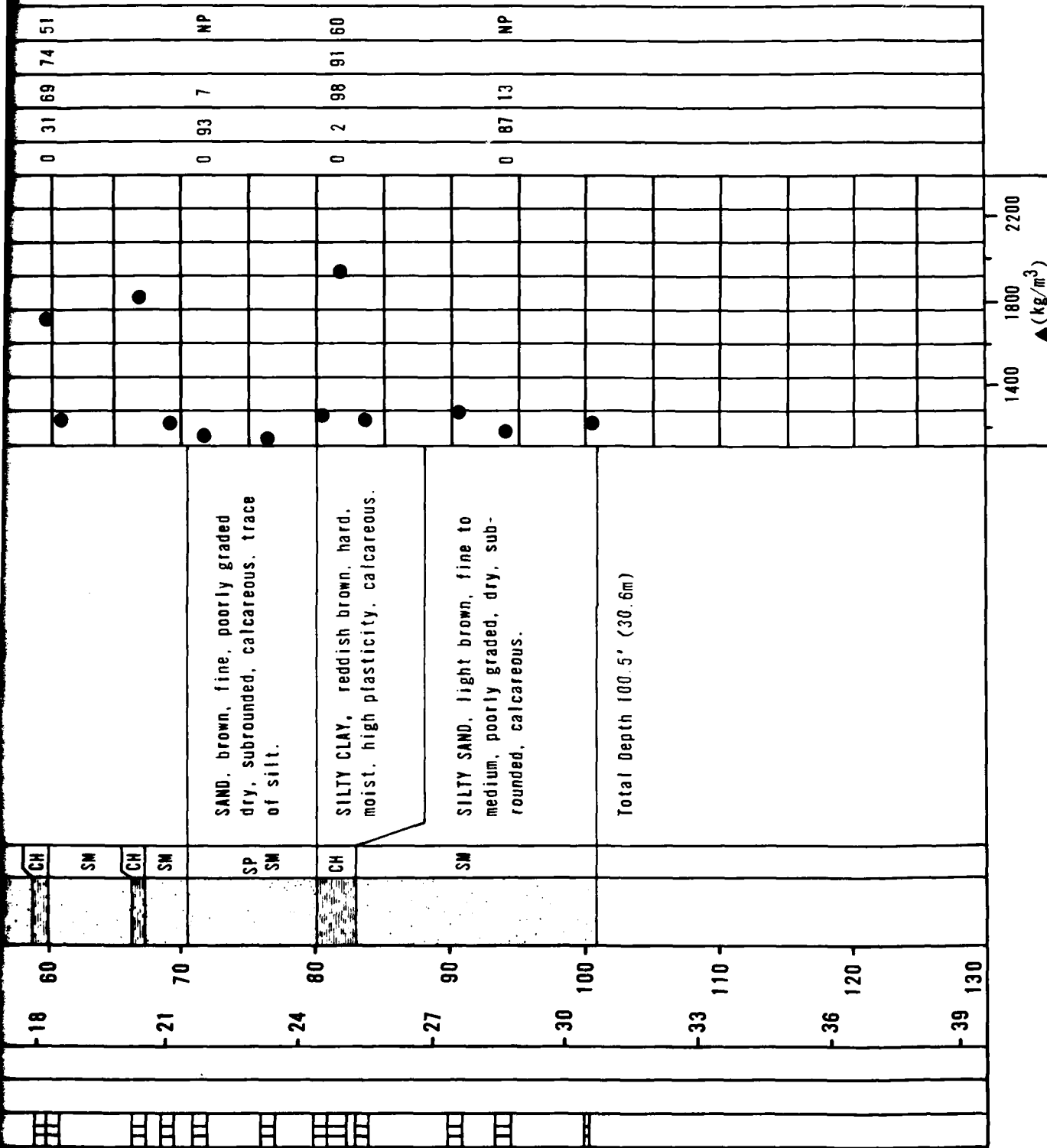
FIGURE
C-27

FUGRO NATIONAL, INC.

3

CHEI BY ROVE

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf)										SIEVE ANALYSIS			
							80	90	100	110	120	130	140	GR	SA	FI	LL	PI		
			0				5	10	15	20	25	30	35	12	74	14		NP		
	53		3		SM	SILTY SAND, brown, fine to coarse, well graded, dry, subangular to subrounded, calcareous; trace of gravel; trace of cobbles.								2	87	11				
	33		6																	
			9		CH	SILTY CLAY, reddish brown, hard, moist, high plasticity, calcareous; trace of sand.								0	8	92	91	64		
	30		12																	
	80		15		SM	SILTY SAND, brown, fine to medium, poorly graded, dry, subangular to subrounded, calcareous; sandy clay, high plasticity (59' to 60' and 66.5' to 67.5').								0	85	15				
			18		CH									0	31	69	74	51		



BORING DETAILS

ELEVATION : 420' (128m)

DATE DRILLED : 25 May-26 May 1977

SAMPLE TYPES

☒ STANDARD PENETRATION TEST

DEPART

2

130

1400 1800 2200

▲ (kg/m³)**SAMPLE TYPES**
☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE
ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 420' (128m)

DATE DRILLED : 25 May-26 May 1977

DRILLING METHOD : Bucket Auger

HOLE DIAMETER : 18" (457mm)

GEOPHYSICAL LOGS : None

CASING INSTALLED : None

WATER LEVEL : Not Apparent

**LOG OF BORING LD-B-15
LECHUGUILLA DESERT, ARIZONA**

 MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

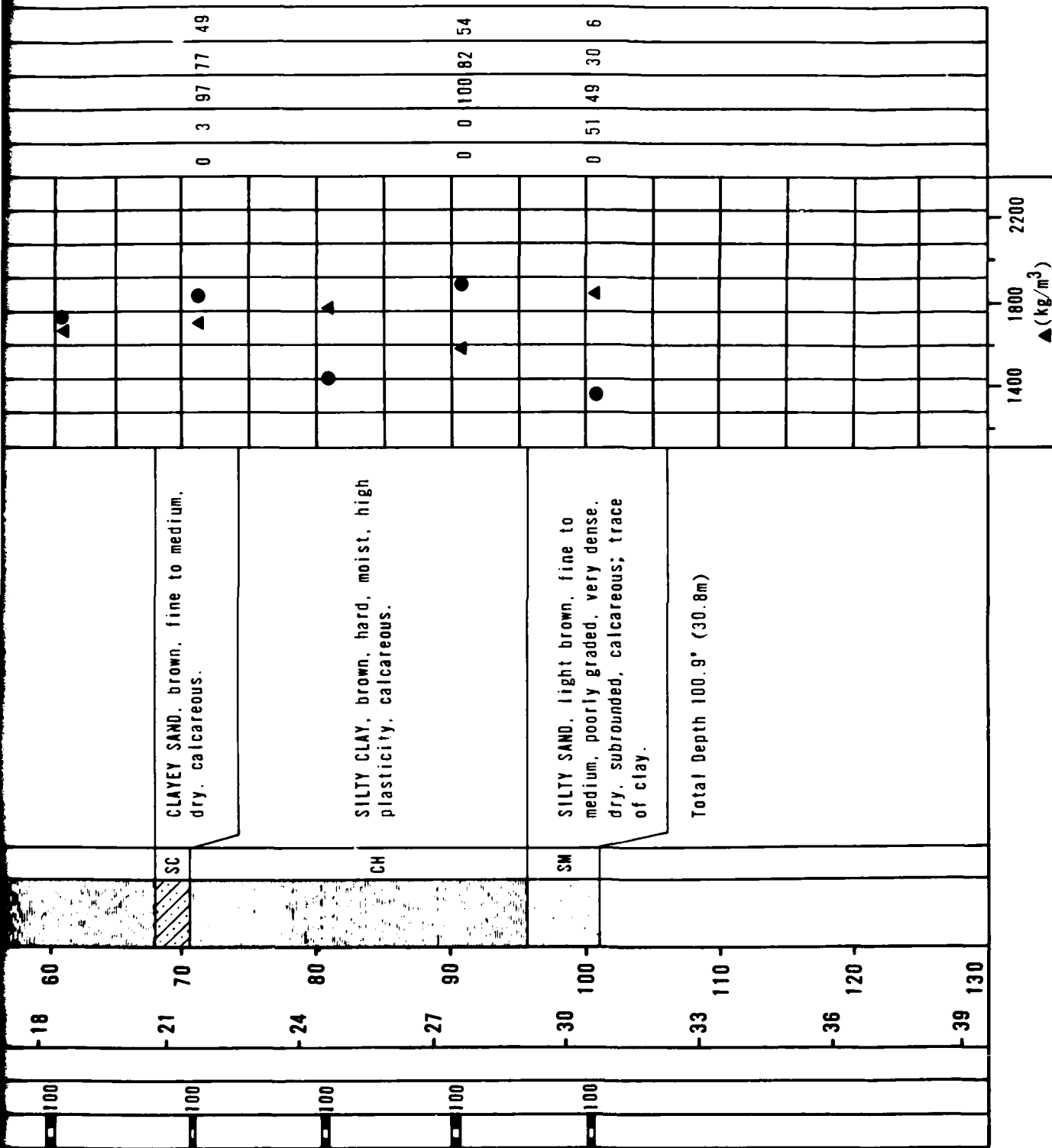
 FIGURE
C-28

FUGRO NATIONAL, INC.

See pages C-1 to C-4 for explanation of logs

3

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH		LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf)													SIEVE ANALYSIS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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SAMPLE TYPES

☐ STANDARD PENETRATION TEST

BORING DETAILS

ELEVATION : 490' (149m)

DATE DRILLED : 25 May-26 May 1977

DEPART

1400 1800 2200
▲ (kg/m³)

SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☒ FUGRO DRIVE

☐ BULK

☒ PITCHER TUBE

ENGINEERING PARAMETERS

- N - STANDARD PENETRATION TEST (ASTM: D-1586-67)
- R - N VALUE GREATER THAN 100 BLOWS/FOOT
- ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
- - MOISTURE CONTENT (ASTM: D-2216-71)
- NR - NO RECOVERY

BORING DETAILS

ELEVATION : 490' (149m)
DATE DRILLED : 25 May-26 May 1977
DRILLING METHOD : Hollow Stem Auger
HOLE DIAMETER : 6 5/8" (168mm)
GEOPHYSICAL LOGS : None
CASING INSTALLED : None
WATER LEVEL : Not Apparent

LOG OF BORING LD-B-16
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSQ

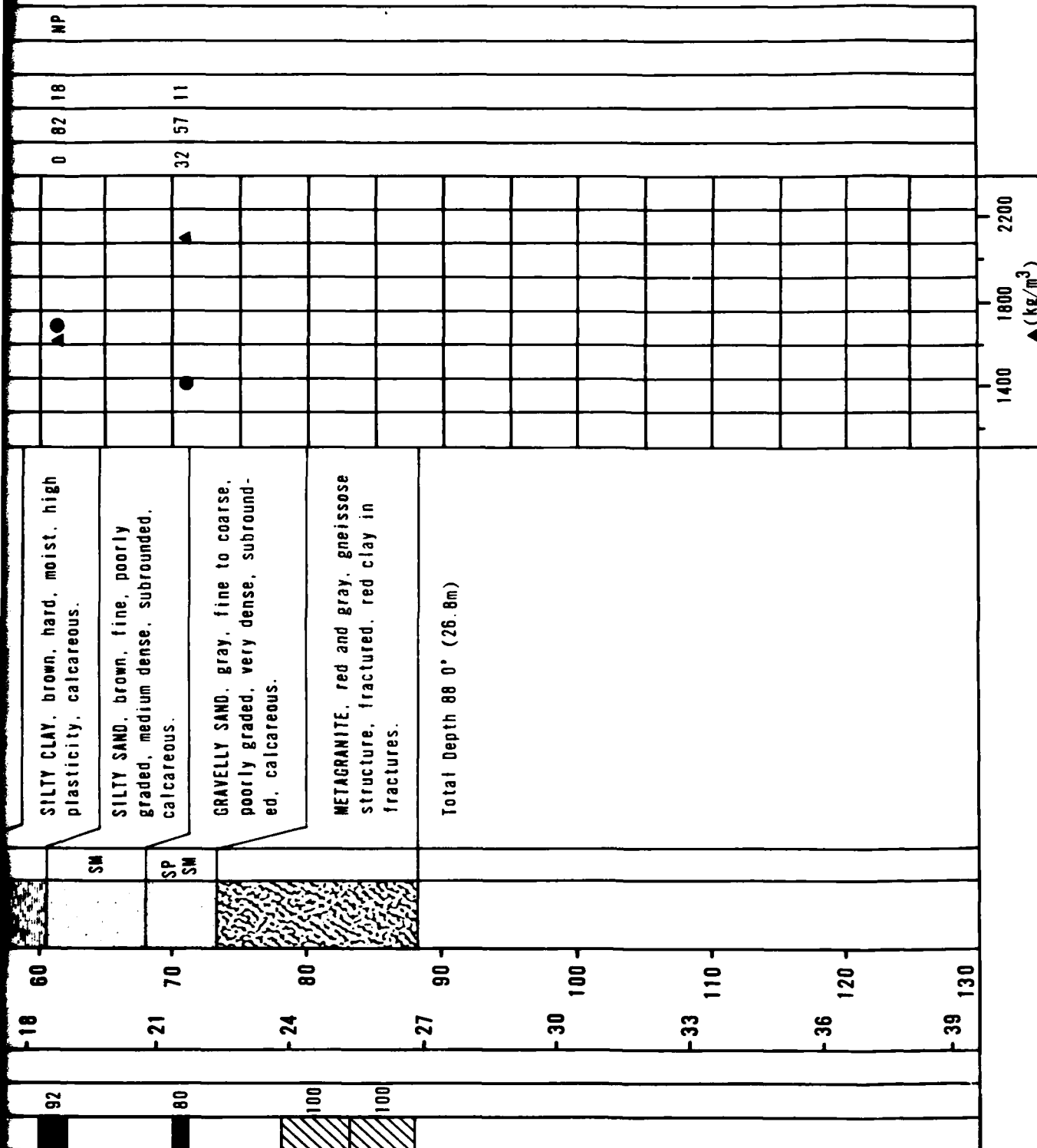
FIGURE
C-29

FUGRO NATIONAL, INC.

See pages C-1 to C-4 for explanation of logs

CHECKED BY _____ APPROVED BY _____

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH		LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf)													SIEVE ANALYSIS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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			0	0		SC	CLAYEY SAND, brown, fine to coarse, loose, dry, angular to subangular, calcareous; trace of gravel.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			



SAMPLE TYPES

☒ STANDARD PENETRATION TEST

BORING DETAILS

ELEVATION : 390' (119m)
DATE DRILLED : 24 May -25 May 1977

LE
MX
DEPARTMENT

SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

☐ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 390' (119m)

DATE DRILLED : 24 May-25 May 1977

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 7/8" (124mm)

GEOPHYSICAL LOGS : NatG, NN, NG,

GG, GM

CASING INSTALLED : 41' (12m)

WATER LEVEL : -

See pages C-1 to C-4 for explanation of logs

LOG OF BORING LD-8-17
LECHUGUILLA DESERT, ARIZONA

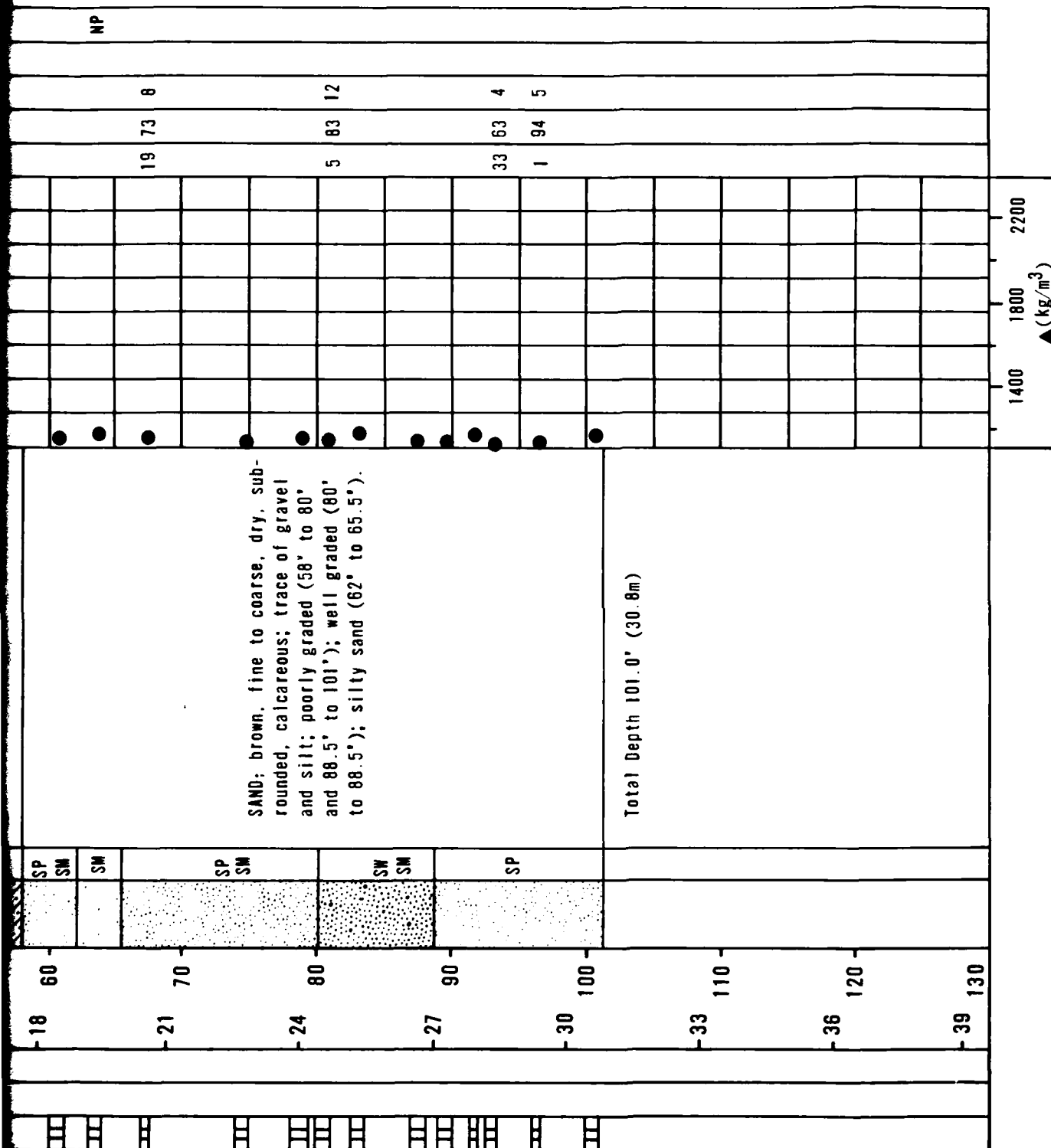
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-30

FUGRO NATIONAL, INC.

3

[illegible]



SAMPLE TYPES

☐ STANDARD PENETRATION TEST

BORING DETAILS

ELEVATION : 710' (216m)

DATE DRILLED : 26 May 28 May 1977

DEPARTING

SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☒ FUGRO DRIVE

☐ BULK

☒ PITCHER TUBE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 710' (216m)

DATE DRILLED : 26 May-28 May 1977

DRILLING METHOD : Bucket Auger

HOLE DIAMETER : 18" (457mm)

GEOPHYSICAL LOGS : None

CASING INSTALLED : None

WATER LEVEL : Not Apparent

See pages C-1 to C-4 for explanation of logs

LOG OF BORING LD-B-18
LECHUGUILLA DESERT, ARIZONA

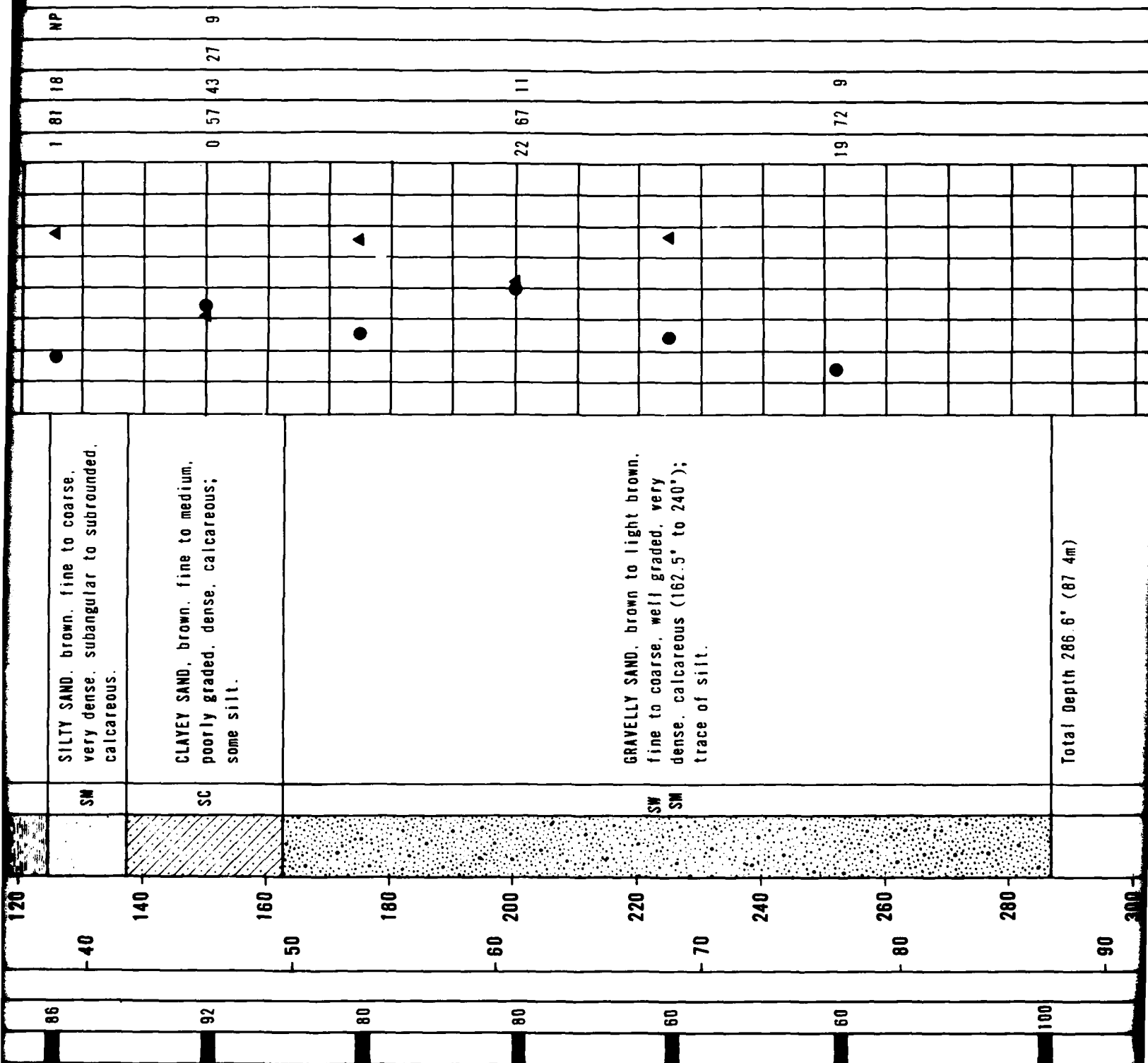
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSQ

FIGURE
C-31

FUGRO NATIONAL, INC.

3

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	▲(pcf)		SIEVE ANALYSIS	
								80 90 100 110 120 130 140	GR SA FI	LL PI	NP
	75	0	0	0		SM SC	SILTY SAND, brown, fine to coarse, well graded, dense, subangular to subrounded, calcareous; trace to a little gravel; trace of clay (0 to 9')	8	66	26	6
	NR							15	77	8	
	72	20									
	76										
	95	-10				SM		4	79	17	
	68	40						16	70	14	
	61	60									
	65	-20				GM	SANDY GRAVEL, brown, fine to coarse, very dense, subangular to subrounded, calcareous; trace of silt; gravelly sand (65' to 75').	26	62	12	
	60					SM					
	60	80				GM					
	90					SM	SILTY SAND, brown, fine to medium, well graded, dense, subangular to subrounded, calcareous.	0	84	16	
	100	-30				CH	SILTY CLAY, brown, hard, moist, high plasticity, calcareous; interbedded with sandy silt.				



▲ (kg/m³)

SAMPLE TYPES

■ STANDARD PENETRATION TEST

■ FUGRO DRIVE

□ BULK

■ PITCHER TUBE

▨ CORE

ENGINEERING PARAMETERS

- N - STANDARD PENETRATION TEST (ASTM: D-1586-67)
- R - N VALUE GREATER THAN 100 BLOWS/FOOT
- ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
- - MOISTURE CONTENT (ASTM: D-2216-71)
- NR - NO RECOVERY

BORING DETAILS

ELEVATION : 540' (165m)
DATE DRILLED : 25 April-27 April 1977
DRILLING METHOD : Rotary Wash
HOLE DIAMETER : 4 7/8" (124mm)
GEOPHYSICAL LOGS : Calp, MatG, NN, NG, GG, GM
CASING INSTALLED : 285' (87m)
WATER LEVEL : —

See pages C-1 to C-4 for explanation of logs

LOG OF BORING LD-C-1
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

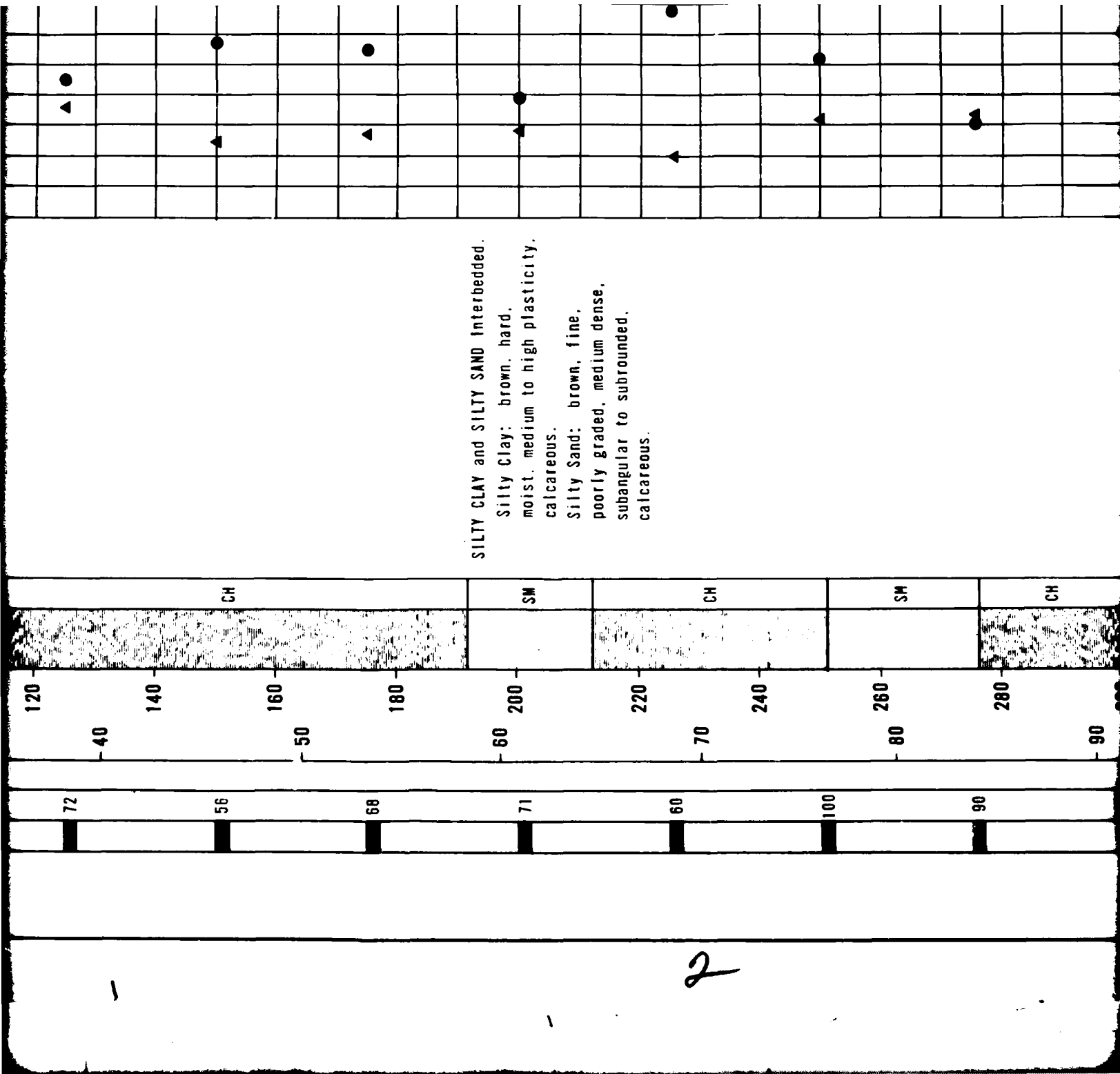
FIGURE
C-32

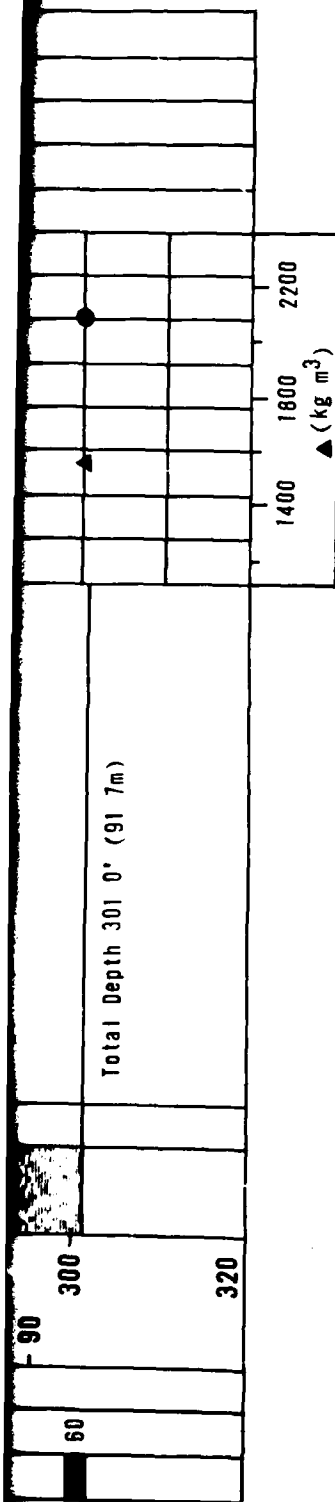
FUGRO NATIONAL, INC.

3

CHE BY — — — ROVE

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf)										SIEVE ANALYSIS			
								80	90	100	110	120	130	140	GR	SA	FI	LL	PI		
	76		0	0		SP	SAND, light brown, fine to coarse, angular to subangular; trace of silt.									2	81	17			
	56					SM															
	84			20		SC	SILTY SAND, brown, fine to coarse, dense, subangular to subrounded, calcareous; trace of gravel; clayey sand (20.5' to 28').									8	80	12			
	55																				
	55		-10	40		SM										3	86	11			
	80																				
	92					CH	SILTY CLAY, SANDY SILT, and SILTY SAND Interbedded.									0	0	100	56		33
	80			60		ML	Silty Clay: brown, hard, moist, high plasticity, calcareous; scattered cemented nodules (41.5' to 58').														
	96		-20			CH	Sandy Silt: brown, hard, moist, non-plastic, calcareous.									0	37	63			
	96			80		SM										0	78	22			
	75					SP	Silty Sand: brown, fine, poorly graded, medium dense, subangular to subrounded, calcareous; sand, trace of silt (86.5' to 95.5').									0	92	8			
	71		-30	100		ML										0	38	62			





SAMPLE TYPES

□ STANDARD PENETRATION TEST

■ FUGRO DRIVE

□ BULK

■ PITCHER TUBE

▨ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 490' (149m)
 DATE DRILLED : 2 May-4 May 1977
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 7/8" (124mm)
 GEOPHYSICAL LOGS : NatG, NN, NG, GG, GM
 CASING INSTALLED : 301' (92m)
 WATER LEVEL : 153' (47m)

See pages C-1 to C-4 for explanation of logs

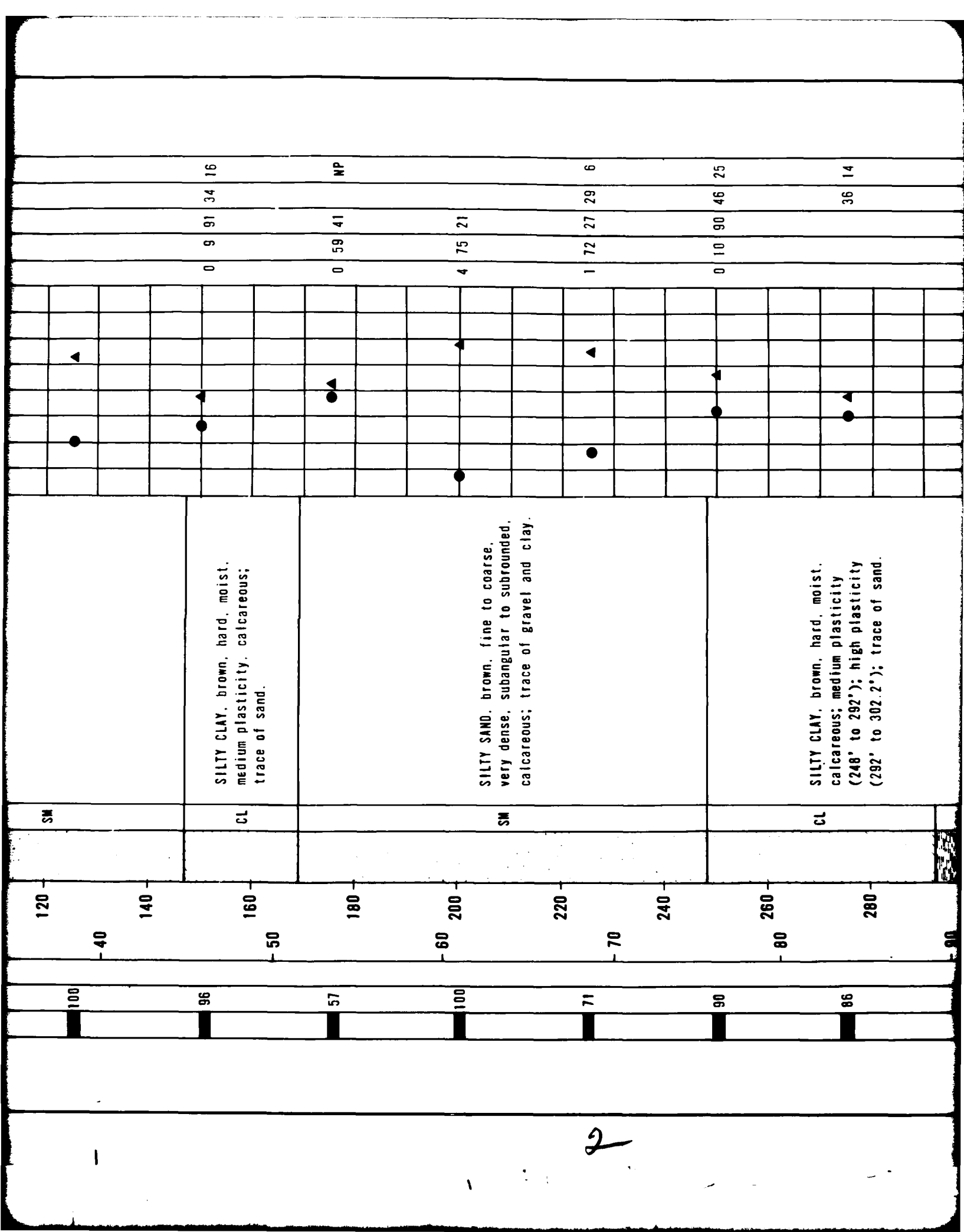
LOG OF BORING LD-C-2
 LECHUGUILLA DESERT, ARIZONA

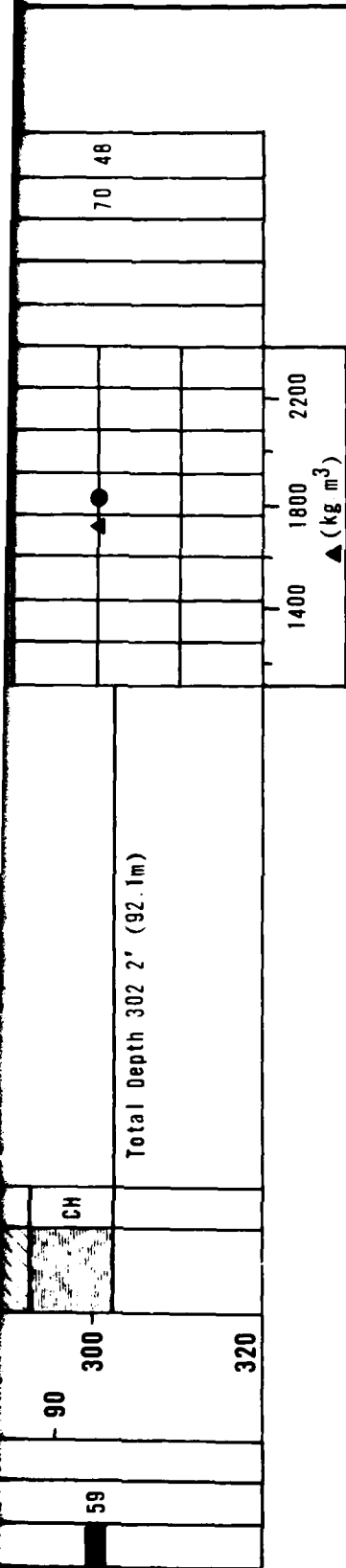
MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-33

FUGRO NATIONAL, INC.

[illegible]





SAMPLE TYPES

■ STANDARD PENETRATION TEST

■ FUGRO DRIVE

■ BULK

■ PITCHER TUBE

■ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 700' (213m)

DATE DRILLED : 4 May-6 May 1977

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 7/8" (124mm)

GEOPHYSICAL LOGS : Calp, NatG, NN, NG, GG, GM

CASING INSTALLED : 302' (92m)

WATER LEVEL : —

See pages C-1 to C-4 for explanation of logs

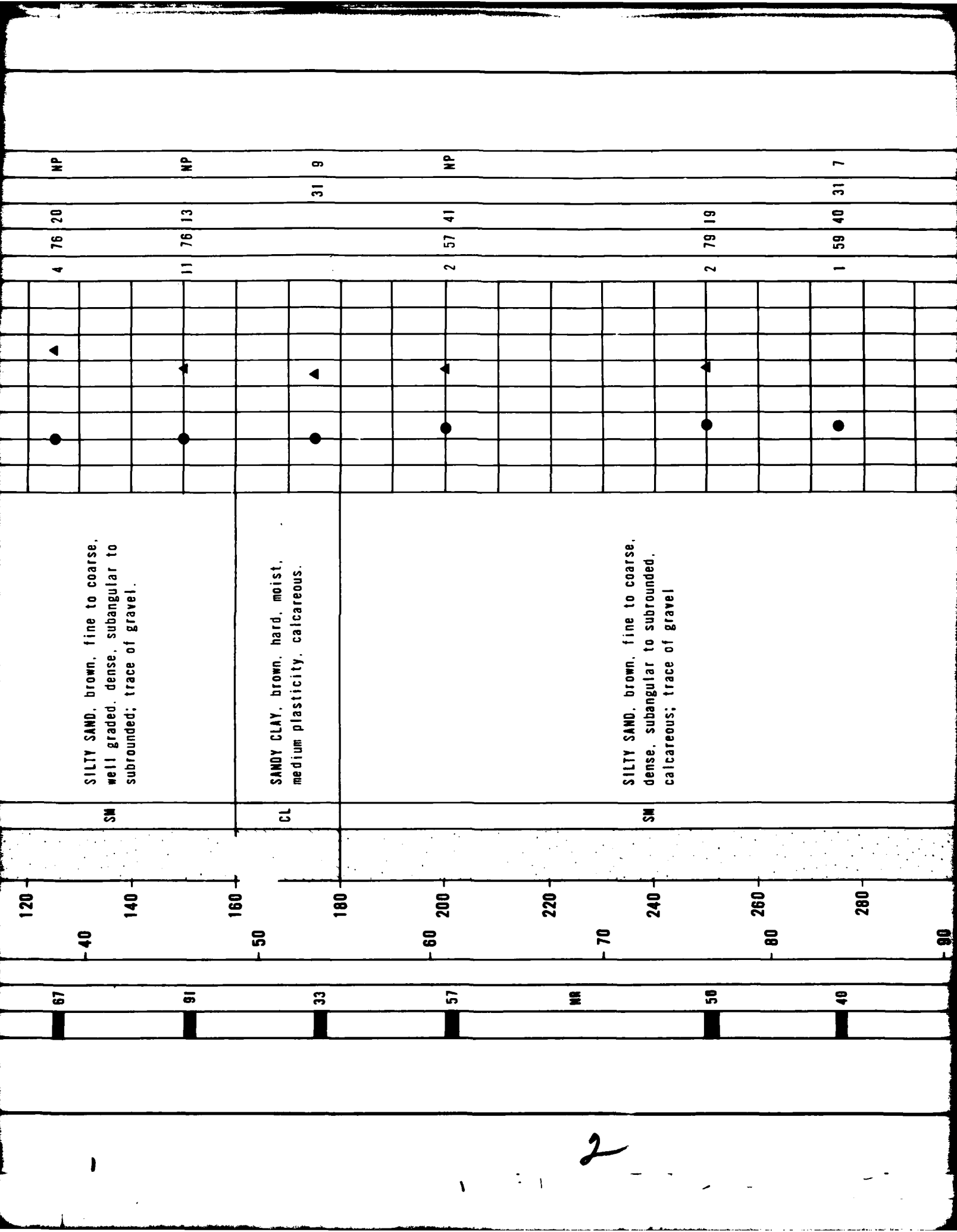
LOG OF BORING LD-C-3
LECHUGUILLA DESERT, ARIZONA

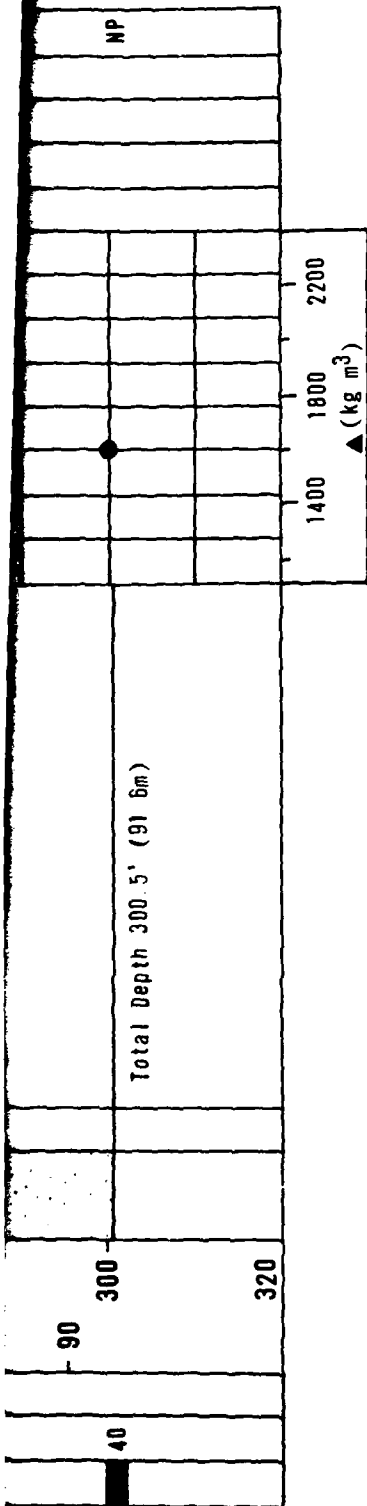
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-34

FUGRO NATIONAL INC.

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION
	64	0	0	0		SC	CLAYEY SAND, brown, fine to coarse, very dense, subangular to subrounded, calcareous; trace of gravel; trace to a little silt, scattered cemented nodules.
	85	20	20	20			
	42	40	40	40			
	45	60	60	60			
	70	80	80	80			
	86	100	100	100			
	68	120	120	120			
	60	-20	60	60		CL	SILTY CLAY, brown, hard, moist, medium plasticity, calcareous; scattered cemented nodules.
	75	-75	75	75			
	65	80	80	80		ML	CLAYEY SAND, brown, fine to coarse, very dense, subangular to subrounded, calcareous; trace of gravel and silt; sandy silt, hard, medium plasticity, scattered cemented nodules (76' to 85')
	73	90	90	90			
	70	-30	100	100		SC	





SAMPLE TYPES

□ STANDARD PENETRATION TEST

■ FUGRO DRIVE

□ BULK

■ PITCHER TUBE

▨ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 910' (277m)

DATE DRILLED : 6 May-8 May 1977

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 7/8" (124mm)

GEOPHYSICAL LOGS : Calp, NatG, NN, NG, GG, GM

CASING INSTALLED : 297' (91m)

WATER LEVEL : _____




LOG OF BORING LD-C-4
LECHUGUILLA DESERT, ARIZONA

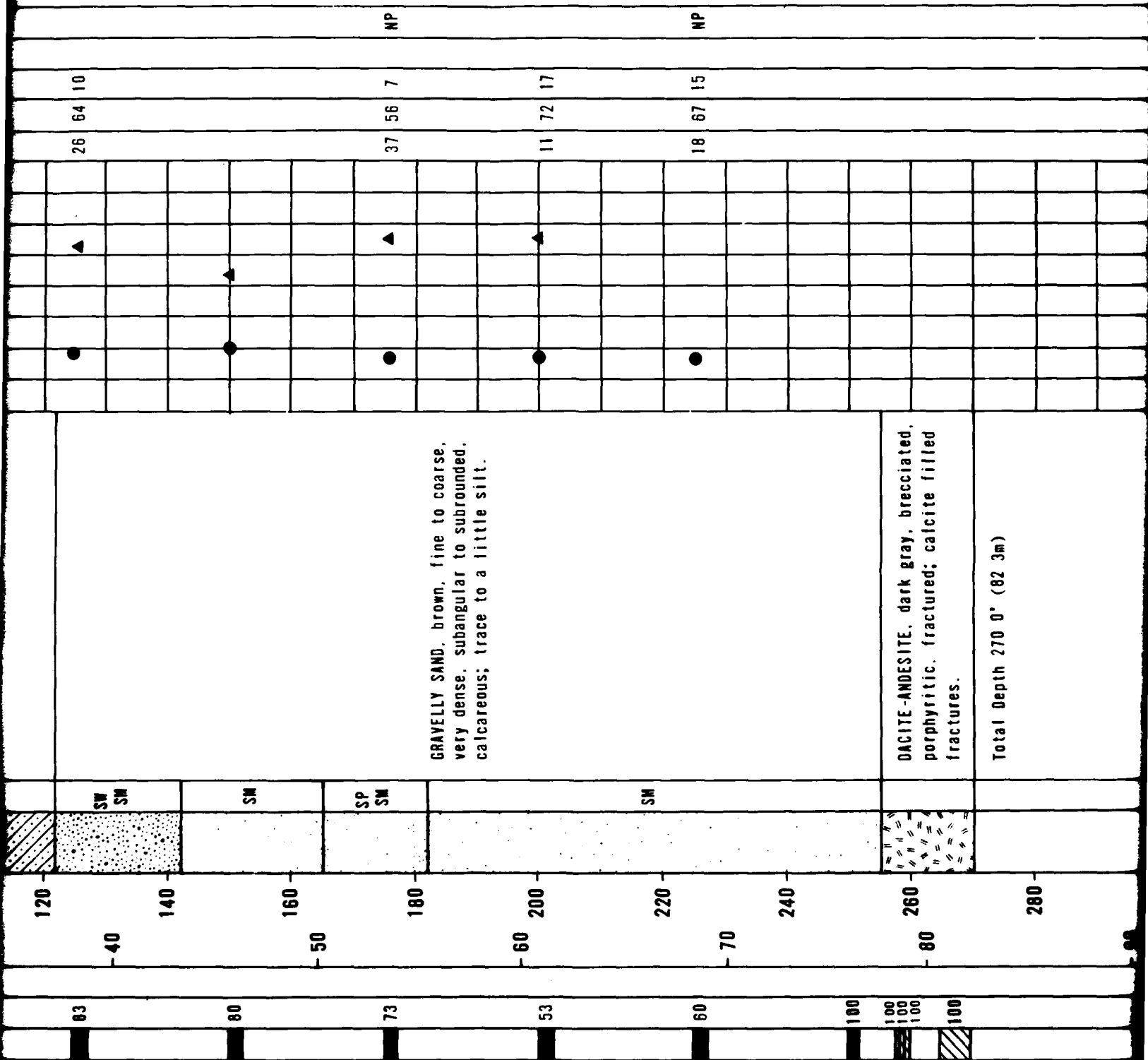
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

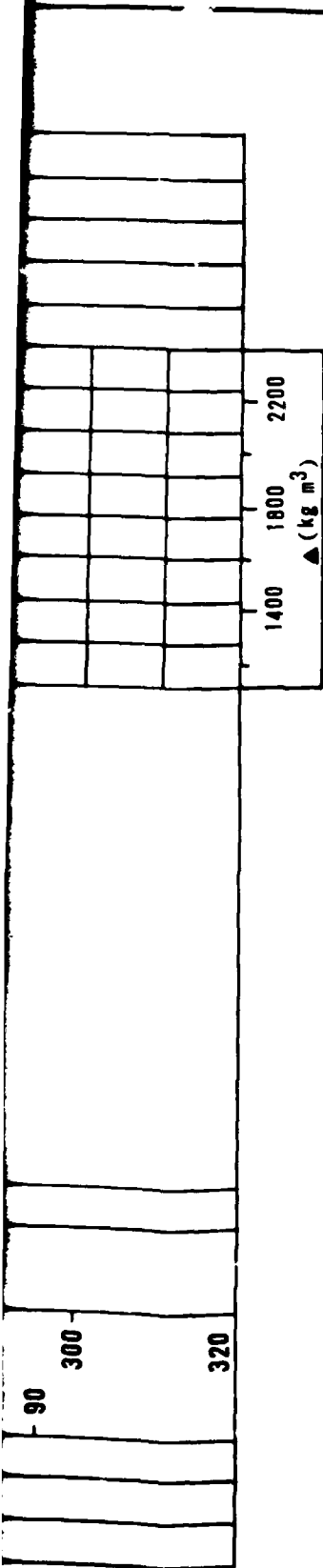
FIGURE
C-35

FUGRO NATIONAL, INC.

See pages C-1 to C-4 for explanation of logs

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf) ● (%)											SIEVE ANALYSIS					
								80	90	100	110	120	130	140	GR	SA	FI	LL	PI					
	88		0	0		SC	CLAYEY SAND, brown, fine to coarse, dense, subangular to subrounded, calcareous; trace of gravel; scattered cemented lenses.											3	78	19	45	26		
	90																							
	80																			0	55	45	40	20
	90			20																0	21	79	34	14
	90		-10			CL	SILTY CLAY, brown, hard, moist, medium plasticity, calcareous; scattered cemented lenses.																	
	85			40																2	49	49	33	14
	80																			6	63	31	36	17
	88		-20																	1	73	36	29	11
	90					SM	CLAYEY SAND, brown, fine to coarse, well graded, dense to very dense, subangular to subrounded, calcareous; trace of gravel; some silt; scattered cemented lenses (36' to 66'); silty sand (66' to 76')															NP		
	80			80																7	83	30		
	73																							
	60		-30	100																				





SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

☐ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 880' (268m)

DATE DRILLED : 9 May-16 May 1977

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 7/8" (124mm)

GEOPHYSICAL LOGS : Calp, NatG, NN, NG, GG, GM

CASING INSTALLED : 263' (80m)

WATER LEVEL : 248' (76m)

LOG OF BORING LD-C-5
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-36

FUGRO NATIONAL INC.

SAMPLE TYPE	% RECOVERY	N VALUE	METERS DEPTH	LITHOLOGY	USCS
80 NR 6	80	-0	0	(diagonal hatching)	SC
82	82	-50	0	(horizontal dashes)	SM
80	80	-50	0	(dots)	SP
58	58	-50	0	(cross-hatch)	SW
88	88	-20	50	(dotted pattern)	SM
60	60	-72	100	(stippled pattern)	CH
89	89	-40	100	(vertical dashes)	SM
70	70	-40	100	(wavy lines)	ML
88	88	-60	150	(solid black)	SM
95	95	-80	250	(solid black)	SM
50	50	-80	250	(solid black)	SM

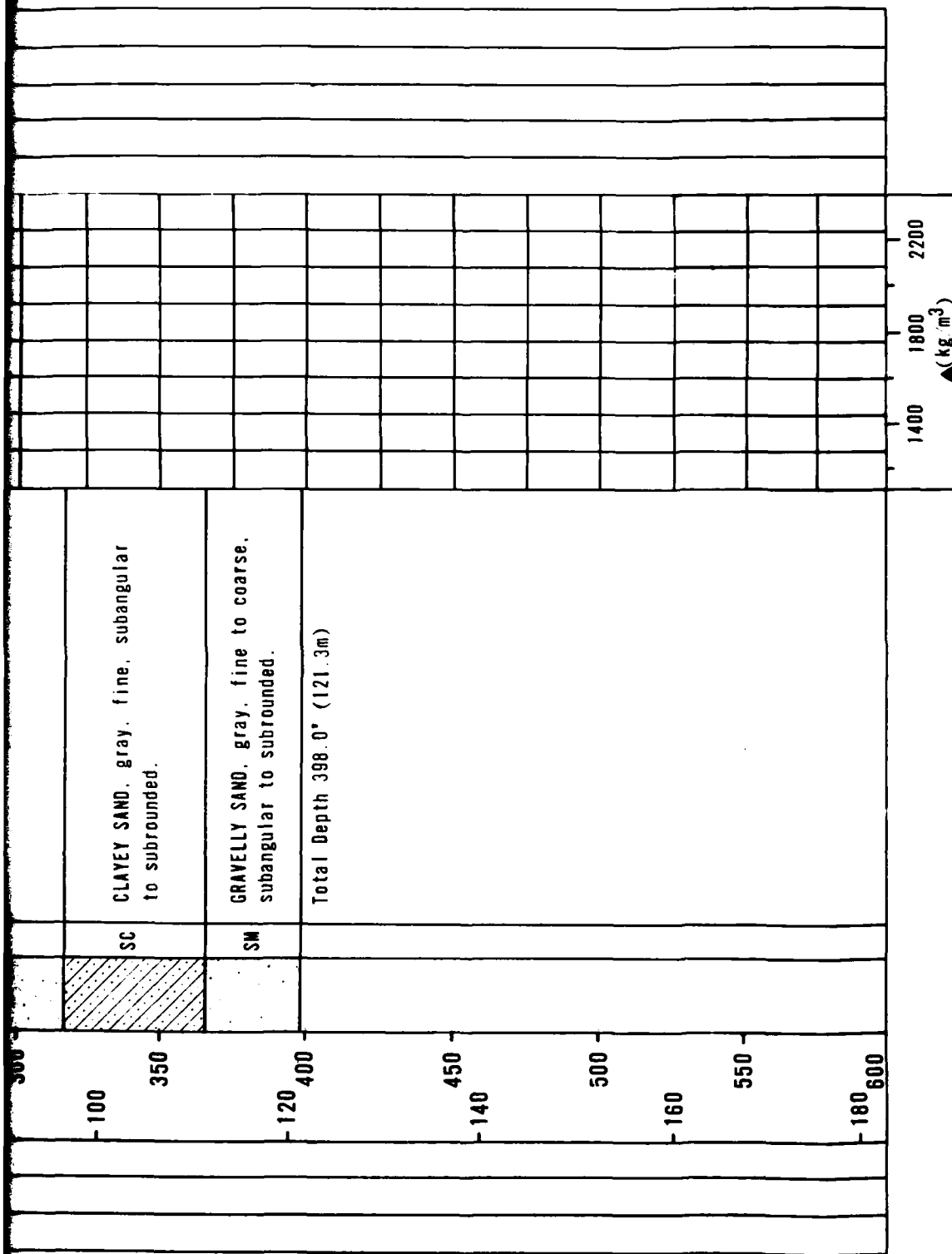
SOIL DESCRIPTION

CLAYEY SAND, brown, fine to medium, dense, subangular to subrounded, calcareous; scattered cemented lenses; trace of gravel; a little silt; sand, loose (0 to 2').

SILT Y SAND, brown, fine, poorly graded, medium dense, subangular to subrounded, calcareous; sand, fine to coarse (17.5' to 25'); silty clay, hard, moist, high plasticity (73' to 88"); scattered cemented lenses and nodules (73' to 95')

SANDY SILT, brown, hard, moist, non-plastic, calcareous; trace of clay.

SILTY SAND, brown, subangular to subrounded; fine, poorly graded (138' to 186'); fine to coarse with some gravel (186' to 318').



SAMPLE TYPES

- ☐ STANDARD PENETRATION TEST
- ☐ FUGRO DRIVE
- ☐ BULK
- ☐ PITCHER TUBE
- ☐ CORE

BORING DETAILS

ELEVATION : 560' (171m)
 DATE DRILLED : 20 May-23 May 1977
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 7/8" (124mm)
 GEOPHYSICAL LOGS : NatG, NN, NG, GG, GM
 CASING INSTALLED : 383' (117m)
 WATER LEVEL : _____

LOG OR BORING
LECHUGUILLA DESER

MX SITING INVESTIGATI
DEPARTMENT OF THE AIR FORCE

FUGRO NATION

SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

☐ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 560' (171m)

DATE DRILLED : 20 May-23 May 1977

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 7/8" (124mm)

GEOPHYSICAL LOGS : NatG, NN, NG, GG, GM

CASING INSTALLED : 383' (117m)

WATER LEVEL : —

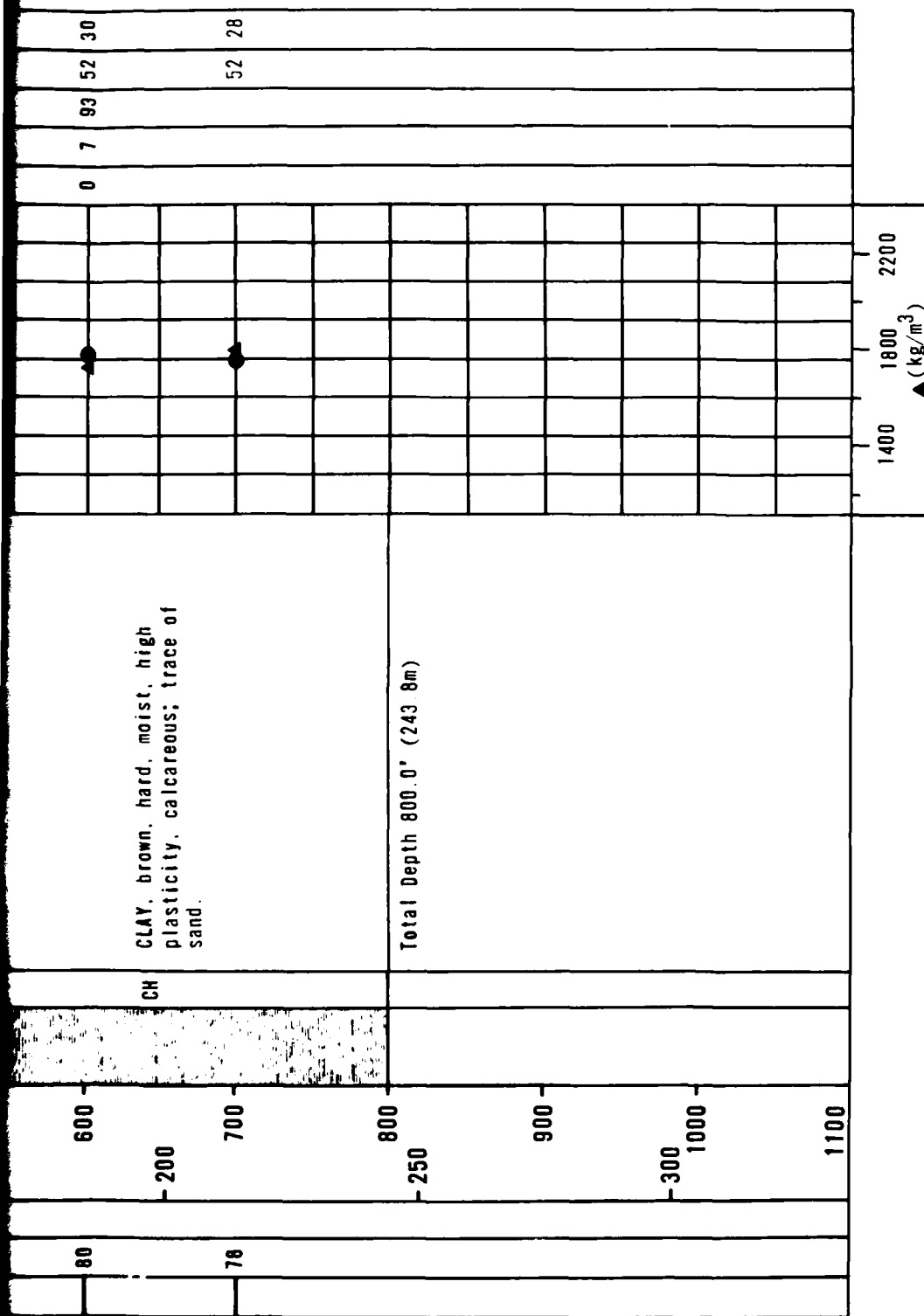
LOG OR BORING LD-C-6
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-37

FUGRO NATIONAL, INC.

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	▲ (pcf) ● (%)													SIEVE ANALYSIS				PI
								80	90	100	110	120	130	140	GR	SA	FI	LL							
92771	92771	0	0	0	SC	SC	SILTY SAND, CLAYEY SAND, and SANDY CLAY Interbedded.										9	68	23	44	25				
92772	92772	0	0	0													5	64	16	42	17				
92773	92773	0	0	0	SM	SM	Silty Sand: brown, fine to coarse, dense, subangular, calcareous; scattered cemented nodules (35' to 45' and 95' to 110'); trace of gravel.										7	51	32	37	17				
92774	92774	0	0	0	CL	CL	Clayey Sand: brown, fine to coarse, dense, subangular, calcareous; scattered cemented nodules (0' to 9' and 15' to 26'); trace gravel; a little to some silt.										0	33	49	37	NP				
92775	92775	0	0	0	SM	SM	Sandy Clay: brown, hard, moist, low plasticity, calcareous; considerable silt; scattered cemented nodules (85' to 95')										0	36	64	28	10				
92776	92776	0	0	0	ML	ML	SILTY SAND, brown, fine to medium, poorly graded, medium dense, subangular, calcareous.										0	76	24		NP				
92777	92777	0	0	0	CL	CL	SANDY SILT, brown, hard, moist, nonplastic, calcareous; trace to a little clay.										0	69	31		NP				
92778	92778	0	0	0	SM	SM	SILTY CLAY, brown, hard, moist, medium plasticity, calcareous.										0	64	36		NP				
92779	92779	0	0	0	SM	SM	SILTY SAND, brown, fine, poorly graded, medium dense, calcareous.										0	50	50		NP				
92780	92780	0	0	0													0	35	65						
92781	92781	0	0	0													0	16	84	36	16				
92782	92782	0	0	0													0	7	93	52	38				



SAMPLE TYPES

- ☒ STANDARD PENETRATION TEST
- ☒ FUGRO DRIVE
- ☐ BULK
- ☒ PITCHER TUBE
- ☒ CORE

BORING DETAILS

ELEVATION : 780' (238m)
 DATE DRILLED : 23 April-3 May 1977
 DRILLING METHOD : Rotary Air Wash
 HOLE DIAMETER : 5 7 8" (149mm)
 GEOPHYSICAL LOGS : NatG, NN, NG, GG, GM
 CASING INSTALLED : 731' (223m)
 WATER LEVEL : 366' (112m)

LOG OF
LECHUGUILLA

MX SITING INVE
DEPARTMENT OF THE AR

FUGRO NA

2

SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

☐ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)
R - N VALUE GREATER THAN 100 BLOWS/FOOT
▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
● - MOISTURE CONTENT (ASTM: D-2216-71)
NR - NO RECOVERY

BORING DETAILS

ELEVATION : 780' (238m)

DATE DRILLED : 23 April-3 May 1977

DRILLING METHOD : Rotary Air Wash

HOLE DIAMETER : 5 7/8" (149mm)

GEOPHYSICAL LOGS : NatG, NN, NG, GG, GM

CASING INSTALLED : 731' (223m)

WATER LEVEL : 366' (112m)

LOG OF BORING LD-D-1
LECHUGUILLA DESERT, ARIZONA

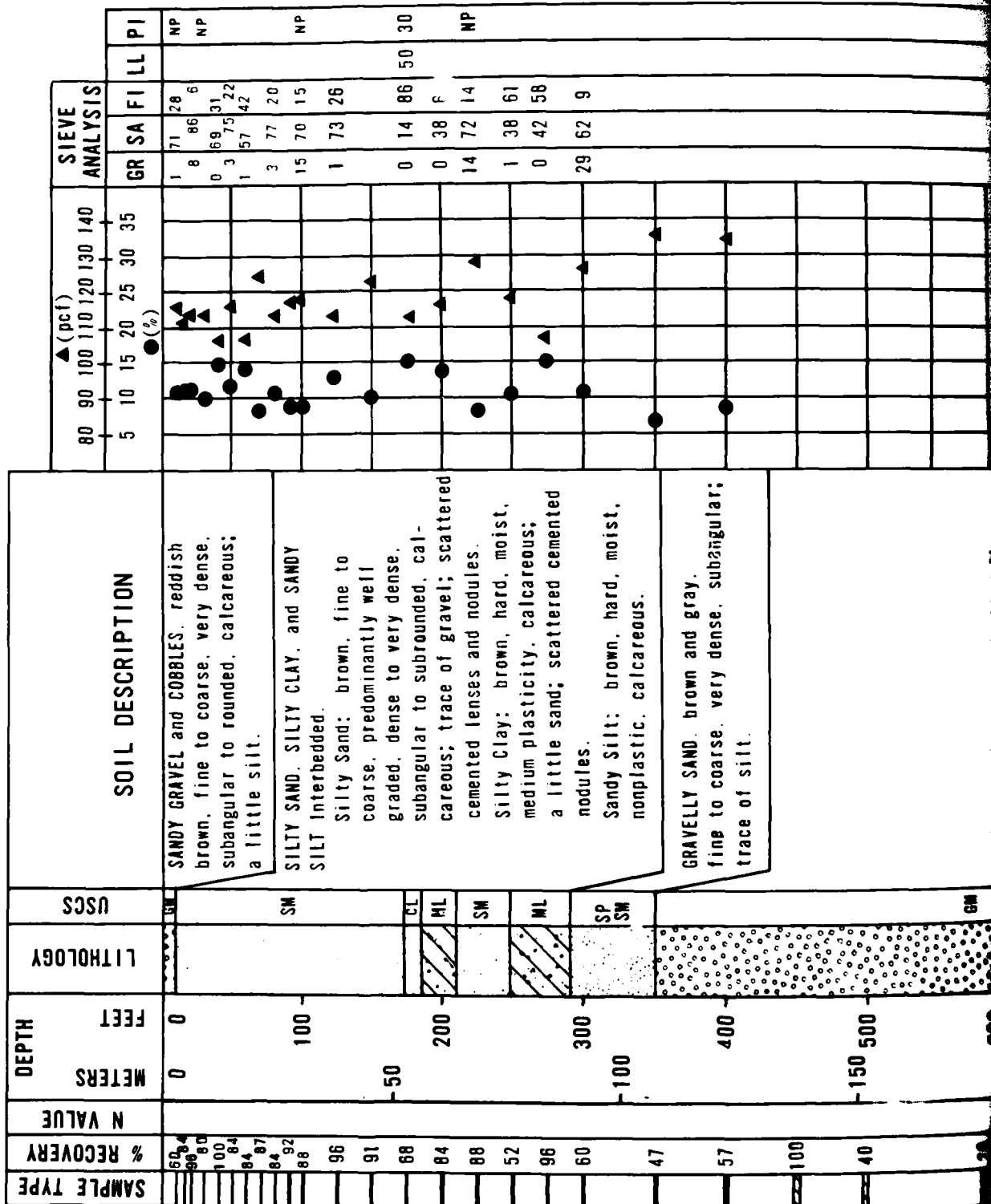
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-38

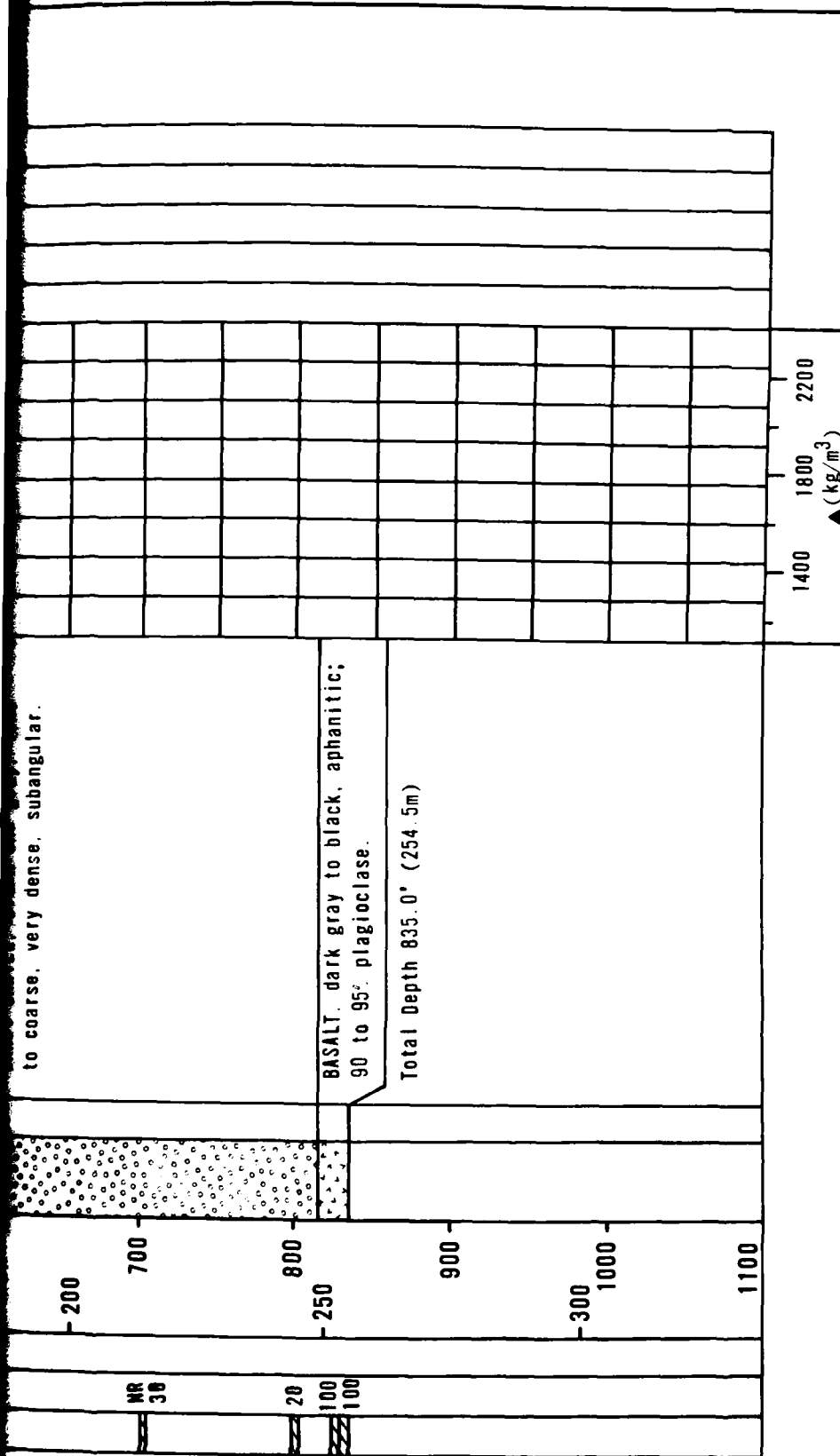
FURRO NATIONAL INC.

3

CHECKED BY _____ APPROVED BY _____



GRAVELLY SAND, brown and gray, fine to coarse, very dense, subangular; trace of silt.



SAMPLE TYPES

□ STANDARD PENETRATION TEST

■ FUGRO DRIVE

□ BULK

■ PITCHER TUBE

▨ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

BORING DETAILS

ELEVATION : 660' (201m)

DATE DRILLED : 4 May-16 May 1977

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 5 7/8" (149mm)

GEOPHYSICAL LOGS : NatG, NN, GG, GM

CASING INSTALLED : 833' (254m)

WATER LEVEL : —

LOG OF BORING LOG
LECHUGUILLA DESERT,

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE -

FUGRO NATIONAL

SAMPLE TYPES

■ STANDARD PENETRATION TEST

■ FUGRO DRIVE

■ BULK

■ PITCHER TUBE

■ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 660' (201m)

DATE DRILLED : 4 May-16 May 1977

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 5 7/8" (149mm)

GEOPHYSICAL LOGS : NatG, NN, GG, GM

CASING INSTALLED : 833' (254m)

WATER LEVEL : —

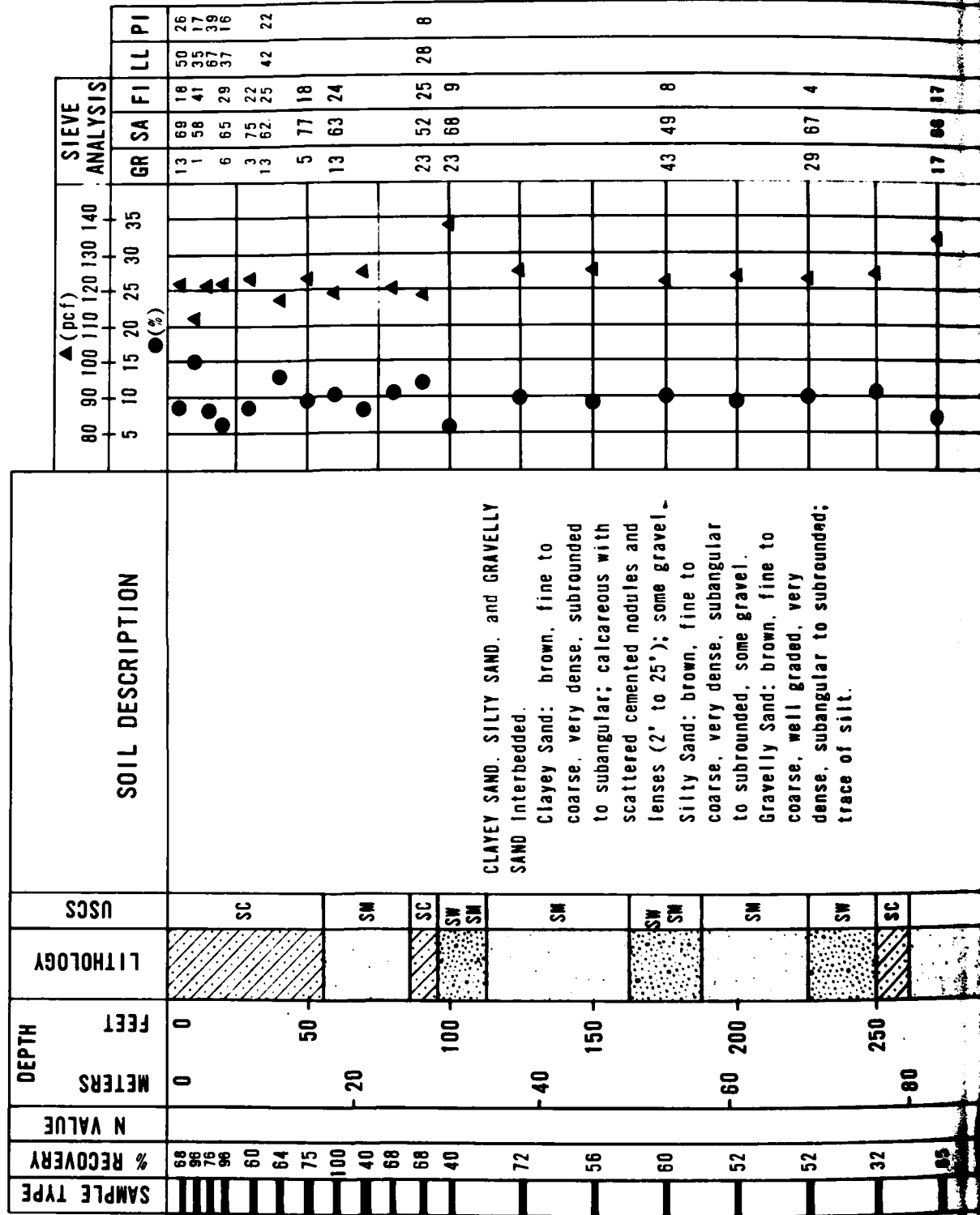
LOG OF BORING LD-D-2
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-39

FUGRO NATIONAL INC.

CHECKED BY _____ APPROVED BY _____



SILTY CLAY, brown, low to medium plasticity; trace of gravel; a little sand.

**SANDY SILT, light brown, hard, moist,
nonplastic.**

CLAYEY SAND, brown, fine to coarse;
some gravel.

GRAVELLY SAND. Light brown, fine to coarse, well graded, very dense, subrounded; a little silt.

QUARTZ MONZONITE, white, weathered, friable, phaneritic.

SAMPLE TYPES

☐ STANDARD PENETRATION TEST

☐ FUGRO DRIVE

☐ BULK

☐ PITCHER TUBE

☐ CORE

ENGINEERING PARAMETERS

N - STANDARD PENETRATION TEST (ASTM: D-1586-67)

R - N VALUE GREATER THAN 100 BLOWS/FOOT

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 880' (268m)

DATE DRILLED : 17 May-24 May 1977

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 5 7/8" (149mm)

GEOPHYSICAL LOGS : Calp, NatG, NN, NG, GG, GM

CASING INSTALLED : 548' (167m)

WATER LEVEL : —

LOG OF BORING LD-D-3
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-40

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0					2	85	33		
	2			SM	Loose		8	77	15		
1	4										
	6										
2	8			SW/SM	Very dense		5	88	8		
3	10										
	12										
4	14			MH	Hard	CLAYEY SILT, dark brown, dry, blocky; trace of gypsum.	0	3	97	73	37
	16			SM	Very dense	SILTY SAND, light brown, fine, poorly graded, dry, subrounded, nonstratified, moderately cemented.					
	18			CH	Hard	CLAY, light green, dry, blocky; trace of black organic material.	0	4	96	81	34
5	20			SM	Very dense	SILTY SAND, light brown, fine, poorly graded, dry, subrounded, nonstratified, moderately cemented.					
	22			CH	Hard	CLAY, light green, dry, blocky; trace of black organic material.					
	24			SM	Very dense	SILTY SAND, light brown, fine, poorly graded, dry, subrounded, nonstratified, moderately cemented.	0	87	13		NP
	26					Total Depth 20.0' (6.1m)					
	28										

TRENCH DETAILS

SURFACE ELEVATION : 420' (128m)
 DATE EXCAVATED : 25 April 1977
 SURFACE GEOLOGIC UNIT : A51f
 TRENCH LENGTH : 80' (24.4m)
 TRENCH ORIENTATION : N70E

LOG OF TRENCH LD-T-1
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 C-41

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0					0	72	28		NP
	2				Loose						
	4			SM		SILTY SAND, light brown, fine, poorly graded, dry, subangular to subrounded, lenticular gravel deposits, noncemented from 0 to 5', moderately cemented from 5' to 8.5'; gravel and trace of cobbles, slightly to very weathered granitics, maximum particle size 6" (152mm).					
	6										
	8						6	48	48	33	8
	10		GC/SC		Medium dense	CLAYEY GRAVEL, reddish brown, fine to coarse, moderately well graded, dry, subangular to rounded, nonstratified, moderately cemented; gravel and trace of cobbles, slightly to very weathered granitics, maximum particle size 2" (51mm).					
	12		SC			CLAYEY SAND, lens, light brown, low plasticity.					
	14		GC/SC			CLAYEY GRAVEL, same as GC/SC above.					
	16										
	18			SM	Very dense	SILTY SAND, brown, fine to medium, poorly graded, dry, subangular, nonstratified, strongly cemented; gravel and trace of cobbles, slightly to very weathered granitics, maximum particle size 4" (102mm).					
	20						8	58	33		NP
	22					Total Depth 20.0' (6.1m)					

TRENCH DETAILS

SURFACE ELEVATION : 540' (16m)
 DATE EXCAVATED : 28 April 1977
 SURFACE GEOLOGIC UNIT : A5y1(A51f)
 TRENCH LENGTH : 80' (18.3m)
 TRENCH ORIENTATION : N85W

LOG OF TRENCH LD-T-2
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 C-42

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0		SM		SILTY SAND, light brown, fine, poorly graded, dry, subangular to subrounded, nonstratified, noncemented; gravel, fresh to slightly weathered granitics, maximum particle size 2" (51mm).					
		2									
		4									
		6					11	79	10		NP
		8									
		10		SW/SM	Very loose	SAND, light brown from 6" to 18", brown from 18" to 20", fine to coarse, well graded, dry, subangular to rounded, cross-bedded, noncemented from 6" to 18", weakly cemented from 18" to 20"; trace of cobbles and boulders, fresh to slightly weathered granitics, maximum particle size 12" (305mm).					
		12									
		14									
		16									
		18									
		20			Medium dense		31	57	12		NP
		22				Total Depth 20.0' (6.1m)					

TRENCH DETAILS

SURFACE ELEVATION : 860' (201m)
 DATE EXCAVATED : 26 April 1977
 SURFACE GEOLOGIC UNIT : A5y
 TRENCH LENGTH : 52' (15.8m)
 TRENCH ORIENTATION : N5E

 LOG OF TRENCH LD-T-3
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-43

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0		SM	Very loose	SILTY SAND, light brown, fine, poorly graded, dry, angular to subrounded, nonstratified, non-cemented; gravel, fresh to slightly weathered granitics and metamorphics, maximum particle size 2" (51mm).	2	71	27		NP
	2									
	1		CL	Stiff	SANDY CLAY, brown, fine to medium, slightly moist, angular to subrounded, cross-beds, weakly cemented; gravel, fresh to slightly weathered granitics and metamorphics, maximum particle size 2" (51mm).	1	33	66	35	14
	4									
	6		SW/SM	Medium dense	SAND, light brown, fine to medium, well graded, dry, angular to subrounded, cross-beds, weakly to moderately cemented; gravel, slightly to moderately weathered granitics and metamorphics, maximum particle size 2" (51mm).					
	8									
	10									
	12									
	14									
	16									
	18									
	20					5	89	6		
	22									
					Total Depth 20.0' (6.1m)					

TRENCH DETAILS

SURFACE ELEVATION : 410' (125m)
 DATE EXCAVATED : 2 May 1977
 SURFACE GEOLOGIC UNIT : A5yf
 TRENCH LENGTH : 58' (17.7m)
 TRENCH ORIENTATION : N39E

LOG OF TRENCH LD-T-4
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-44

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0		SC	Loose	CLAYEY SAND, brown to reddish brown, fine to medium, poorly graded, dry, angular to sub-angular, nonstratified, noncemented; gravel, fresh to very weathered granitics and metamorphics, maximum particle size 2.5" (64mm).	15	60	25		
	2					1	65	34	24	8
	1		SM	Dense	SILTY SAND, light brown, fine to coarse, poorly graded, dry, subangular, nonstratified, weakly cemented; gravel, fresh to very weathered granitics and metamorphics, maximum particle size 2.5" (64mm).					
	4									
	6		CL	Hard	SANDY CLAY, light grayish green, fine to coarse, poorly graded, dry, subangular, nonstratified, moderately cemented; gravel, slightly weathered granitic.					
	2		SM	Dense	SILTY SAND, light brown, fine to coarse, poorly graded, dry, subangular, nonstratified, moderately cemented.					
	8		SP		SAND, reddish yellow, fine, poorly graded, dry, subangular, nonstratified, moderately cemented.					
	3		ML	Very stiff	SANDY SILT, light yellow, fine, poorly graded, dry, subangular, nonstratified, weakly cemented.					
	10		SM	Dense	SILTY SAND, light grayish green, poorly graded, dry, subangular, nonstratified, moderately cemented; trace of moderately weathered granitic gravel.	2	65	33		NP
	12		ML	Very stiff	SANDY SILT, light yellow, fine, poorly graded, dry, subangular, nonstratified, weakly cemented.					
	4									
	14		SM	Medium dense	SILTY SAND, light brown, fine, poorly graded, dry, subangular nonstratified, weakly cemented.					
	16				Total Depth 15.0' (4.6m)					
	5									
	18									
	6									
	20									
	22									

TRENCH DETAILS

SURFACE ELEVATION : 540' (165m)
 DATE EXCAVATED : 3 May 1977
 SURFACE GEOLOGIC UNIT : A511
 TRENCH LENGTH : 61' (18.6m)
 TRENCH ORIENTATION : N64W

LOG OF TRENCH LD-T-5
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 C-45

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0		SC	Loose	CLAYEY SAND, light brown, fine, poorly graded, dry, angular to subangular, nonstratified, weakly cemented; gravel, slightly to very weathered granitics and metamorphics, maximum particle size 3" (76mm).	6	68	25	27	8
	2		SM	Dense	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, angular to subangular, nonstratified, moderately cemented; gravel and trace of cobbles, slightly to very weathered granitics and metamorphics, maximum particle size 6" (152mm).	15	68	17		NP
	4									
	6				QUARTZ MONZONITE, very weathered, friable.					
	8				Total Depth 7.5' (2.3m)					
	10									
	12									
	14									
	16									
	18									
	20									
	22									

TRENCH DETAILS

SURFACE ELEVATION : 800' (274m)
 DATE EXCAVATED : 4 May 1977
 SURFACE GEOLOGIC UNIT : A51f
 TRENCH LENGTH : 34' (10.4m)
 TRENCH ORIENTATION : N12W

LOG OF TRENCH LD-T-6
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-46

FUGRO NATIONAL : 1C.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0		SW/SM	Loose	SILTY SAND, light brown, fine to coarse, well graded, slightly moist, angular to subangular, nonstratified, weakly cemented; gravel, moderately to very weathered granitics, maximum particle size 2" (51mm).	3	90	7		NP
	2									
	1									
	4									
	6									
	2		SC		CLAYEY SAND, reddish brown, fine to medium, poorly graded, slightly moist, subangular, nonstratified, moderately cemented; gravel, moderately to very weathered granitics, maximum particle size 2" (51mm).	15	65	20	43	21
	8									
	3									
	10									
	12			Very dense						
	4		SM		SILTY SAND, reddish brown, medium to coarse, poorly graded, slightly moist, angular to subangular, nonstratified, moderately cemented; gravel, moderately to very weathered granitics, maximum particle size 2" (51mm).					
	14									
	16									
	5		SC		CLAYEY SAND, brown, fine to medium, poorly graded, slightly moist, subangular, nonstratified, moderately cemented; gravel, moderately to very weathered granitics, maximum particle size 2" (51mm).					
	18									
	6									
	20					4	63	33	29	12
	22				Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 890' (271m)
 DATE EXCAVATED : 4 May 1977
 SURFACE GEOLOGIC UNIT : A5y1(A51f)
 TRENCH LENGTH : 55' (16.8m)
 TRENCH ORIENTATION : N10E

LOG OF TRENCH LD-T-7
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSC

FIGURE
 C-47

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0		SM	Loose	SILTY SAND, light brown, fine to coarse, poorly graded, dry, subangular, nonstratified, weakly cemented; gravel, fresh granitics, maximum particle size 0.5" (13mm).	4	71	25		
	2									
	1			Dense		8	65	26	54	32
	4									
	6									
2	8									
	10		SC	Very dense	CLAYEY SAND, reddish brown, fine to medium, slightly moist, subangular to subrounded, nonstratified, moderately cemented from 2.2' to 5.5', strongly cemented from 5.5' to 18'; gravel, fresh granitics, maximum particle size 0.5" (13mm).					
	12									
4	14									
	16									
5	18					3	58	39	32	12
	20				Total Depth 19.0' (5.8m)					
	22									

TRENCH DETAILS

SURFACE ELEVATION : 880' (268m)
 DATE EXCAVATED : 5 May 1977
 SURFACE GEOLOGIC UNIT : A51y(A51f)
 TRENCH LENGTH : 80' (18.3m)
 TRENCH ORIENTATION : N83E

LOG OF TRENCH LD-T-8
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-48

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0		SM	Loose	SILTY SAND, light brown, fine to medium, poorly graded, dry, angular to subangular, non-stratified, noncemented; gravel and trace of cobbles, slightly weathered granitics, maximum particle size 3.5" (89mm).	18	58	23		NP
	2									
	1									
	4			Very dense						
	6									
2	8		SC	Dense	CLAYEY SAND, reddish brown, fine to coarse, poorly graded, slightly moist, nonstratified, strongly cemented from 1.5' to 6' and from 11' to 18', moderately cemented from 6' to 11', maximum particle size 1" (25mm).	4	88	28	42	20
3	10									
	12									
4	14			Very dense						
	16									
5	18		SP/SC	Very dense	GRAVELLY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, poorly stratified, strongly cemented; gravel and some cobbles, fresh to moderately weathered granitics, maximum particle size 6" (152mm).	18	48	12	37	17
6	20									
	22				Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 980' (293m)
 DATE EXCAVATED : 6 May 1977
 SURFACE GEOLOGIC UNIT : A5iy
 TRENCH LENGTH : 54' (16.5m)
 TRENCH ORIENTATION : N5W

LOG OF TRENCH LD-T-9
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-49

UGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0			Loose		4	76	20		NP
	2										
	1										
	4										
	6										
	2										
	8			SM	Dense	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular, poorly stratified, noncemented from 0 to 1', moderately cemented from 1' to 15.6'; gravel, moderately weathered granitics, maximum particle size 1" (25mm).	4	68	27		NP
	10										
	12										
	4										
	14										
	16										
	5			SC	Very dense	CLAYEY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, poorly stratified, strongly cemented; gravel, moderately weathered granitics, maximum particle size 1" (25mm).					
	18										
	20						5	58	39	34	14
	6										
	22					Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 710' (218m)
 DATE EXCAVATED : 7 May 1977
 SURFACE GEOLOGIC UNIT : A5yf(A5if)
 TRENCH LENGTH : 58' (17.1m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH LD-T-10
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 C-50

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0		SM	Loose	SILTY SAND, light brown, fine, poorly graded, dry, subangular, nonstratified, weakly cemented; gravel, fresh to slightly weathered granitics, maximum particle size 0.8" (20mm).	4	65	31		NP
	2										
	4			SC							
	6										
	8				Dense	CLAYEY SAND, brown, fine to coarse, poorly graded, slightly moist, nonstratified, weakly to moderately cemented; gravel, fresh to slightly weathered, granitics, maximum particle size 0.8" (20mm).	3	60	37	46	28
	10			SM		SILTY SAND, light brown, medium to coarse, poorly graded, slightly moist, nonstratified, moderately cemented.					
	12										
	14			SC	Very dense	CLAYEY SAND, brown, fine to coarse, poorly graded, dry, lensed, moderately to strongly cemented, maximum particle size 0.5" (13mm).					
	16			ML		SANDY SILT, brown, fine to medium, dry, moderately cemented.					
	18										
	20			SC	Very dense		17	63	20	38	19
	22					Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 880' (207m)
 DATE EXCAVATED : 8 May 1977
 SURFACE GEOLOGIC UNIT : A5y1
 TRENCH LENGTH : 52' (15.8m)
 TRENCH ORIENTATION : N30W

LOG OF TRENCH LD-T-11
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-51

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0		SM	Loose	SILTY SAND, light brown, fine, poorly graded, dry, subangular, nonstratified, weakly cemented; gravel, fresh to moderately weathered granitics, maximum particle size 0.8" (20mm).	10	60	30		NP
	2										
	1										
	4										
	6			SC	Dense	CLAYEY SAND, brown, fine to medium, poorly graded, slightly moist, subangular to subrounded, lensed, moderately cemented; gravel, fresh to moderately weathered granitics, maximum particle size 1" (25mm).	6	72	22	46	24
	2										
	8										
	3	10		SM	Loose	SILTY SAND, lens, light brown, fine to medium, poorly graded, slightly moist, subangular, non-stratified, weakly cemented.					
	12										
	4										
	14			SW/SP	Dense	SAND, lens, reddish brown, fine to coarse, well graded, slightly moist, subangular, nonstratified, moderately cemented.					
	16										
	5										
	18			SP		SAND, light brown, fine to medium, poorly graded, slightly moist, subangular to subrounded, non-stratified, moderately cemented.					
	6			SW/SP	Dense	SAND, same as SW/SP above.					
	20			SC	Very dense	CLAYEY SAND, same as SC above, except strongly cemented.	12	68	20	67	40
	22					Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 840' (288m)
 DATE EXCAVATED : 9 May 1977
 SURFACE GEOLOGIC UNIT : A5y1
 TRENCH LENGTH : 54' (16.5m)
 TRENCH ORIENTATION : N87W

LOG OF TRENCH LD-T-12
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-52

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0					3	69	28		NP
	2		SM	Loose	SILTY SAND, light brown, fine, poorly graded, dry, angular to subangular, lensed, weakly cemented; gravel, fresh to slightly weathered granitics, maximum particle size 0.8" (20mm).					
	4									
	6									
	8			Medium dense	CLAYEY SAND, brown, medium to coarse, poorly graded, slightly moist, lensed, moderately cemented; gravel, fresh to moderately weathered granitics, maximum particle size 1.5" (38mm).	10	69	21	44	24
	10		SC							
	12									
	14			Loose	CLAYEY SAND, lens, same as above except weakly cemented and greater percentage of gravel.					
	16									
	18		SM	Dense	SILTY SAND, lens, light brown, fine to coarse, poorly graded, slightly moist, subangular, non-stratified, moderately cemented.					
	20					3	71	26	43	20
	22				Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 770' (235m)
 DATE EXCAVATED : 9 May 1977
 SURFACE GEOLOGIC UNIT : A51yf
 TRENCH LENGTH : 55' (13.8m)
 TRENCH ORIENTATION : N55W

LOG OF TRENCH LD-T-13
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-53

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0		GP	Loose	SANDY GRAVEL, light brown, fine to coarse, poorly graded, dry, subrounded to rounded, nonstratified, noncemented; gravel and trace of cobbles, fresh to slightly weathered granitics, maximum particle size 90" (254mm).	24	35	3		
	2										
	1										
	4										
	6			SM	Medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, dry, subrounded to rounded, weakly cemented from 4" to 8", moderately cemented from 8" to 16"; gravel and trace of cobbles fresh to slightly weathered granitics maximum particle size 6" (152mm).	0	51	49		
	8										
	10										
	12										
	14			SC	Dense	CLAYEY SAND, reddish brown, fine to coarse, poorly graded, dry, subangular, nonstratified, moderately cemented; gravel, slightly weathered granitics.	11	73	16	44	23
	16										
	18										
	20										
	22					Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 980' (293m)
 DATE EXCAVATED : 11 May 1977
 SURFACE GEOLOGIC UNIT : A51yf
 TRENCH LENGTH : 52' (15.8m)
 TRENCH ORIENTATION : N85E

 LOG OF TRENCH LD-T-14
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 C-54

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0		SW/SM	Loose	SILTY SAND, light brown, fine to coarse, well graded, dry, angular to subangular, nonstratified, noncemented; gravel, slightly to very weathered granitics, maximum particle size 1" (25mm).	12	77	11		NP
	2									
	4		SC	Medium dense	CLAYEY SAND, brown, fine to medium, poorly graded, slightly moist, subangular, nonstratified, moderately cemented; gravel, moderately weathered granitics, maximum particle size 1" (25mm).	7	74	19	47	25
	6									
	8									
	10		SW/SM	Loose	SAND, light brown, fine to coarse, well graded, slightly moist, subangular to subrounded, cross-bedded and lensed, weakly to noncemented; trace of cobbles and boulders, moderately to very weathered granitics, maximum particle size 15" (381mm).					
	12									
	14			Stiff	SANDY SILT, lens, brown, fine, dry, nonstratified, moderately cemented.					
	16									
	18		SC	Dense	CLAYEY SAND, brown, fine to medium, poorly graded, dry, angular to subangular, nonstratified, moderately cemented; gravel, moderately weathered granitics, maximum particle size 1" (25mm).	3	81	16	51	26
	20				Total Depth 20.0' (6.1m)					
	22									

TRENCH DETAILS

SURFACE ELEVATION : 830' (253m)
 DATE EXCAVATED : 18 May 1977
 SURFACE GEOLOGIC UNIT : A51yf
 TRENCH LENGTH : 53' (16.2m)
 TRENCH ORIENTATION : N40W

LOG OF TRENCH LD-T-15
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-55

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0					2	77	21		NP
	2			SM	Loose	SILTY SAND, light brown, fine to medium, poorly graded, dry, subangular, lensed, weakly cemented from 0 to 4', moderately cemented lens from 4' to 4.8'; gravel, fresh to moderately weathered granitics, maximum particle size 0.5" (13mm).					
	4				Medium dense						
	6										
	8			SM	Dense	SILTY SAND, light brown, fine to coarse, poorly graded, dry, subangular, moderately cemented, maximum particle size 0.5" (13mm).	0	43	57		NP
	10										
	12										
	14			ML	Stiff	SANDY SILT, light brown, fine, poorly graded, dry, subangular, lensed, moderately cemented; gravel, fresh to moderately weathered granitics, maximum particle size 0.8" (20mm).					
	16										
	18										
	20										
	22					Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 680' (201m)
 DATE EXCAVATED : 1/ May 1977
 SURFACE GEOLOGIC UNIT : A5yf(A51f)
 TRENCH LENGTH : 59' (18.0m)
 TRENCH ORIENTATION : N31E

 LOG OF TRENCH LD-T-16
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 C-56

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0			Loose		2	81	17		NP
	2									
	1									
	4									
	6									
	2									
	8		SM	Medium dense	SILTY SAND, light brown, fine to medium, poorly graded, dry from 0 to 2', and approximately 15' to 17', slightly moist from 2' to 15', angular to subangular, bedded, weakly cemented from 0 to 2', moderately cemented from 2' to approximately 15', strongly cemented from 15' to 17'; gravel and trace of cobbles, very weathered granitics or metagranitics, maximum particle size 3.5" (89mm).	1	73	27		NP
	3									
	10									
	12									
	4									
	14									
	16			Very dense		1	75	24		NP
	5									
	18				Total Depth 17.0' (5.2m)					
	6									
	20									
	22									

TRENCH DETAILS

SURFACE ELEVATION : 800' (183m)
 DATE EXCAVATED : 18 May 1977
 SURFACE GEOLOGIC UNIT : A5lyf
 TRENCH LENGTH : 83' (19.2m)
 TRENCH ORIENTATION : N10W

LOG OF TRENCH LD-T-17
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-57

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0					10	78	12		
	2				Very loose						
	1					SAND, light brown, fine to coarse, well graded, dry, subangular to subrounded, lensed, noncemented from 0 to 3.7', weakly cemented from 3.7' to 8'; gravel and trace of cobbles, slightly to moderately weathered granitics, maximum particle size 8" (152mm).					
	4			SW/SM							
	6						5	87	8		
	2										
	8										
	3				Loose		26	54	4		
	10					SAND, light brown, fine to coarse, poorly graded, dry, subangular to subrounded, bedded, weakly cemented; some cobbles and boulders, fresh to slightly weathered granitics, maximum particle size 14" (356mm).					
	12			SP							
	4										
	14										
	5										
	16					SILTY SAND, light brown, fine to coarse, poorly graded, dry, subangular, nonstratified; gravel, slightly weathered granitics, maximum particle size 0.3" (8mm).					
	18			SM	Medium dense						
	6						18	68	14		NP
	20					Total Depth 20.0' (6.1m)					
	22										

TRENCH DETAILS

SURFACE ELEVATION : 780' (238m)
 DATE EXCAVATED : 18 May 1977
 SURFACE GEOLOGIC UNIT : A5iy
 TRENCH LENGTH : 48' (14.6m)
 TRENCH ORIENTATION : N10E

LOG OF TRENCH LD-T-18
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-58

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0			Medium dense		7	62	31		NP
	2									
	1									
	4		SM		SILTY SAND, brown, fine to medium, poorly graded, dry, angular to subangular, nonstratified, moderately cemented; gravel, very weathered granitics, maximum particle size 1" (25mm).	1	57	42		NP
	6			Dense						
	2									
	8									
	3									
	10									
	12		II	Very dense	QUARTZ MONZONITE, very weathered, friable.					
	4				Total Depth 13.0' (4.0m)					
	14									
	16									
	5									
	18									
	6									
	20									
	22									

TRENCH DETAILS

SURFACE ELEVATION : 485' (148m)
 DATE EXCAVATED : 20 May 1977
 SURFACE GEOLOGIC UNIT : A51f
 TRENCH LENGTH : 53' (16.2m)
 TRENCH ORIENTATION : E-W

LOG OF TRENCH LD-T-19
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-59

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0		SM	Loose	SILTY SAND, light brown, fine, poorly graded, dry, nonstratified, weakly cemented, maximum particle size 1" (25mm).	1	77	22		NP
	2									
	1									
	4					4	55	41	50	29
	6		SC	Medium dense	CLAYEY SAND, brown, fine to medium, poorly graded, dry, angular to subangular, bedded, moderately cemented; gravel, very weathered granitics, maximum particle size 1.5" (38mm).					
	8									
	10									
	12		SM		SILTY SAND, brown, medium to coarse, poorly graded, dry, angular to subangular, nonstratified, moderately cemented.					
	14		SC	Dense						
	16			Medium dense						
	18		SM	Dense	SILTY SAND, light brown, fine to coarse, poorly graded, dry, subangular to subrounded, bedded, moderately cemented; gravel, very weathered granitics, maximum particle size 1.5" (38mm).	4	77	19		NP
	20									
	22				Total Depth 21.0' (6.4m)					

TRENCH DETAILS

SURFACE ELEVATION : 480' (146m)
 DATE EXCAVATED : 20 May 1977
 SURFACE GEOLOGIC UNIT : A511
 TRENCH LENGTH : 57' (17.4m)
 TRENCH ORIENTATION : N25W

LOG OF TRENCH LD-T-20
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-60

FUGRO NATIONAL, INC.

AD-A113 450

FUGRO NATIONAL INC - LONG BEACH CA

F/G 8/13

MX SITING INVESTIGATION. GEOTECHNICAL EVALUATION OF LUKE BOMBIN--ETC(U)

JAN 78

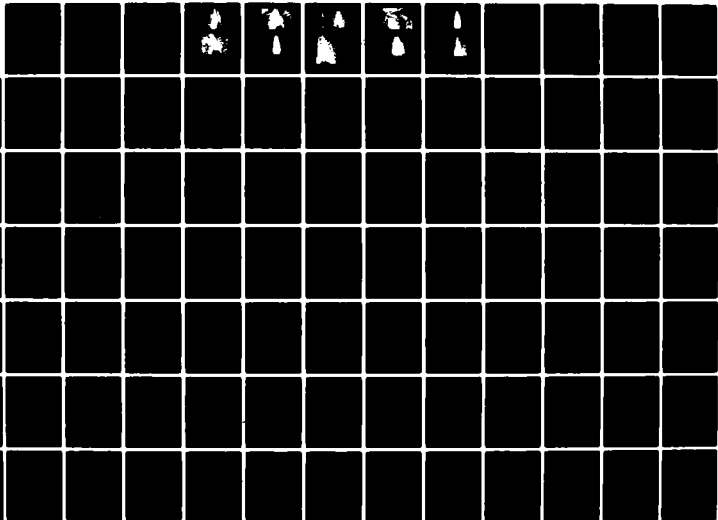
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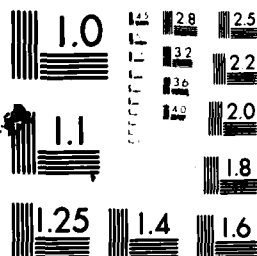


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3 OF 5

AD-

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MICROCOPY RESOLUTION TEST CHART
NBS 1010-A

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
	0									
	0									
	2									
	1									
	4									
	6									
	2									
	8									
	3									
	10									
	12									
	4									
	14									
	16									
	5									
	18									
	8									
	20									
	22									

TRENCH DETAILS

SURFACE ELEVATION : 580' (171m)
 DATE EXCAVATED : 24 May 1977
 SURFACE GEOLOGIC UNIT : A51
 TRENCH LENGTH : 42' (12.8m)
 TRENCH ORIENTATION : N20W

LOG OF TRENCH LD-T-21
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 C-61

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0		SM	Loose	SILTY SAND, light brown, fine to coarse, poorly graded, dry, subangular to subrounded, poorly stratified, weakly cemented; gravel and few cobbles, slightly to very weathered metamorphics, maximum particle size 8" (152mm).	16	71	13		NP
	2										
	1										
	4										
	6										
	2										
	8			GP	Medium dense	SANDY GRAVEL, brown, fine to coarse, poorly graded, slightly moist, subangular to rounded, poorly stratified, moderately cemented; some cobbles and boulders, slightly to very weathered metamorphics, maximum particle size 24" (610mm).					
	3	10									
	12										
	4										
	14						31	32	2		
	16					Total Depth 15.0' (4.6m)					
	5										
	18										
	6	20									
	22										

TRENCH DETAILS

SURFACE ELEVATION : 840' (195m)
 DATE EXCAVATED : 25 May 1977
 SURFACE GEOLOGIC UNIT : A51c
 TRENCH LENGTH : 42' (128m)
 TRENCH ORIENTATION : N70W

LOG OF TRENCH LD-T-22
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-62

UGRO NATIONAL, INC.

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	SIEVE ANALYSIS				
	METERS	FEET					GR	SA	FI	LL	PI
	0	0				SILTY SAND, brown, fine to medium, poorly graded, dry, angular to subrounded, nonstratified, noncemented; gravel, slightly to very weathered granitics and metagranitics, maximum particle size 1" (25mm).	10	70	20		NP
	2			SM	Loose						
	1										
	4						45	49	6		
	6										
	2										
	8										
	3	10									
	12			SP/SM	Medium dense	SAND, brown, fine to coarse, poorly graded, dry, angular to subrounded, nonstratified, moderately cemented; gravel and cobbles, slightly to very weathered granitics and metagranitics, maximum particle size 8" (203mm).					
	4										
	14										
	5	16									
	18										
	6	20									
	22					Total Depth 21.0' (6.4m)					

TRENCH DETAILS

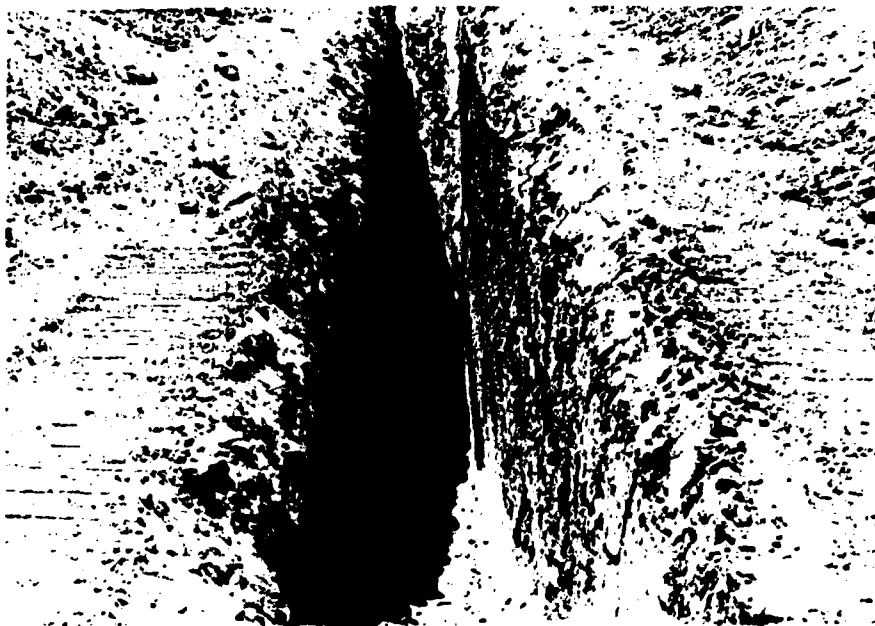
SURFACE ELEVATION : 480' (140m)
 DATE EXCAVATED : 25 May 1977
 SURFACE GEOLOGIC UNIT : A5iyf
 TRENCH LENGTH : 58' (17.1m)
 TRENCH ORIENTATION : N55W

LOG OF TRENCH LD-T-23
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 C-63

FUGRO NATIONAL, INC.



View of trench LD-T-1 (Looking West).



View of trench LD-T-3 showing the weakly cemented zone
in the upper 7 feet (2.1 meters) (Looking Northwest).

**TRENCH PHOTOS
LECHIGUILLA DESERT, ARIZONA**

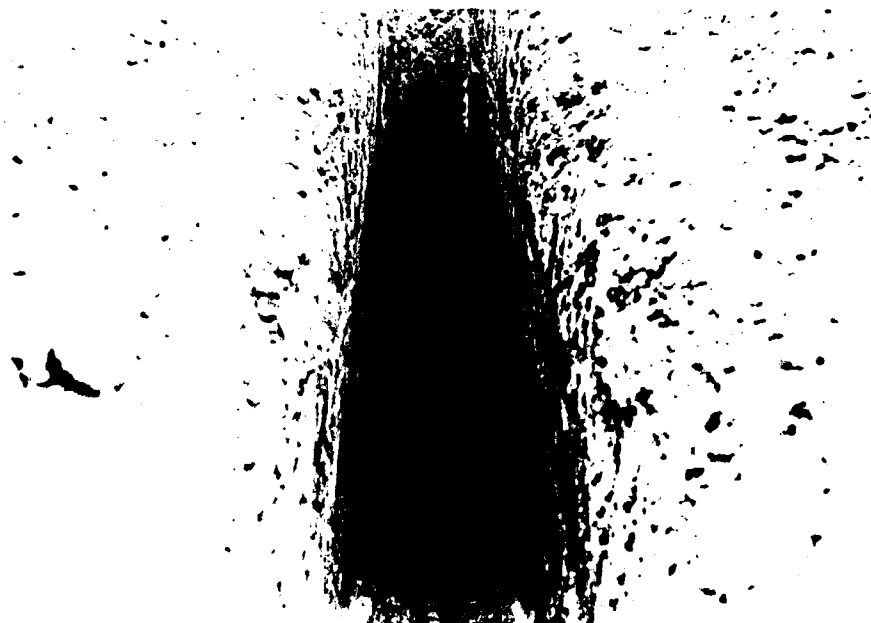
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMSO

FIGURE
C-64

FUGRO NATIONAL, INC.



View of trench LD-T-5 (Looking West).



View of trench LD-T-6 (Looking West).

**TRENCH PHOTOS
LECHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-65

FUGRO NATIONAL, INC.



View of trench LD-T-17 (Looking North).



View of trench LD-T-9 with hydraulic shoring in place (Looking North).

**TRENCH PHOTOS
LECHUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-66

FUGRO NATIONAL, INC.



View of trench LD-T-18 showing the weakly cemented zone in the upper 4 feet (1.2 meters) and a partial view of CAT 225 backhoe (Looking South).



View of trench LD-T-19 (Looking West).

**TRENCH PHOTOS
LECHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS0

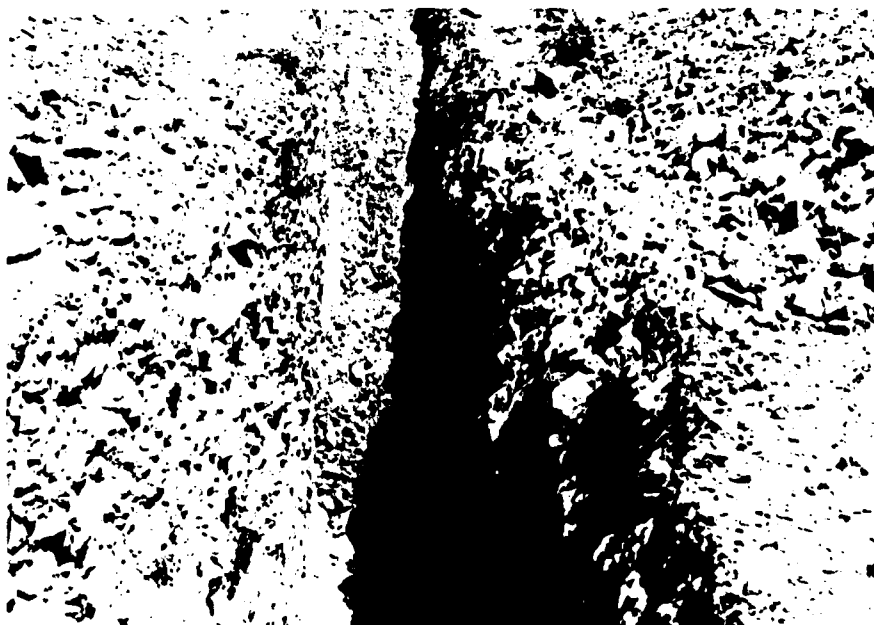
FIGURE

C-67

FUGRO NATIONAL, INC.



View of trench LD-T-20 with hydraulic shoring in place
(Looking West).



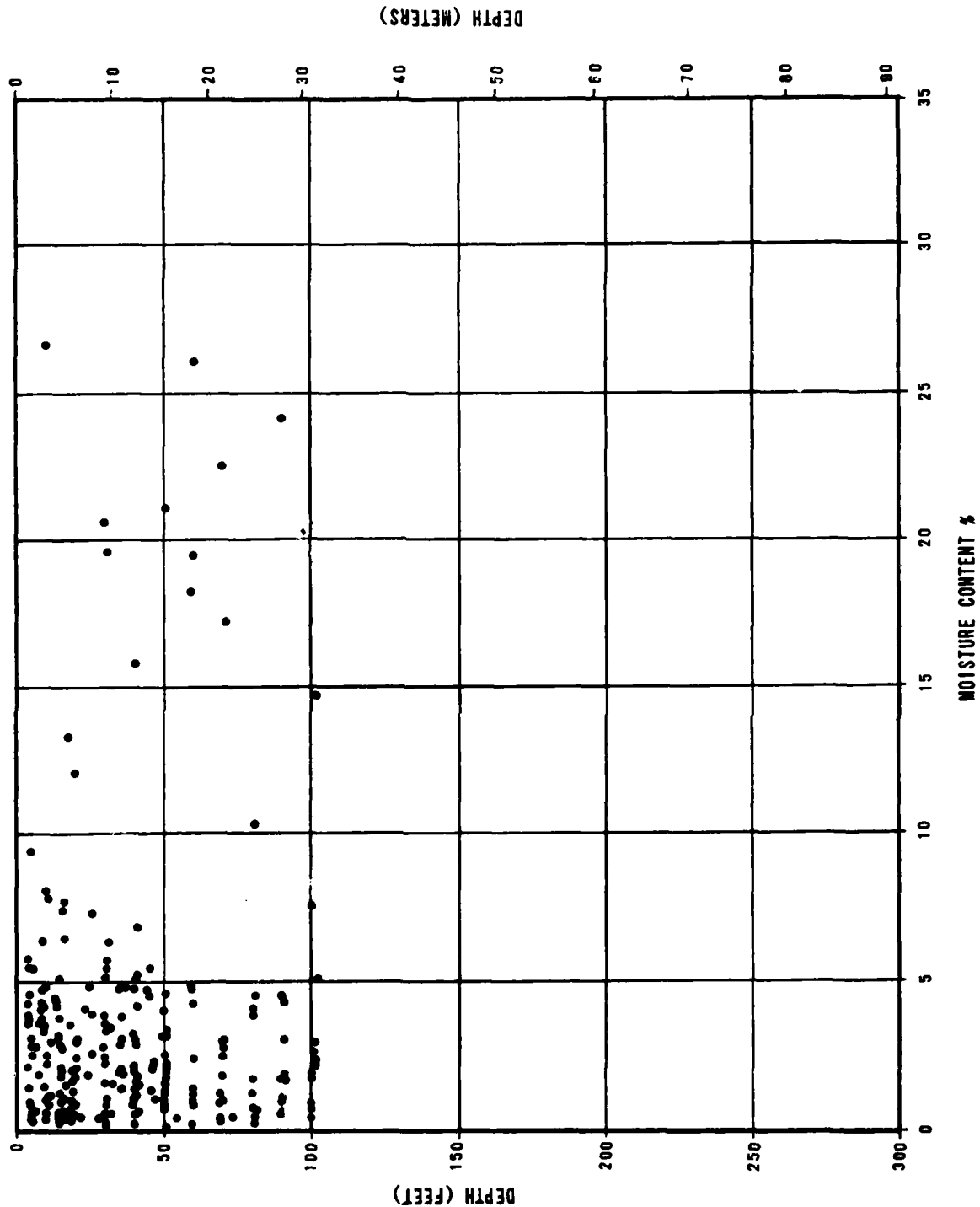
View of trench LD-T-21 (Looking South).

**TRENCH PHOTOS
LECHUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-68

FUGRO NATIONAL, INC.

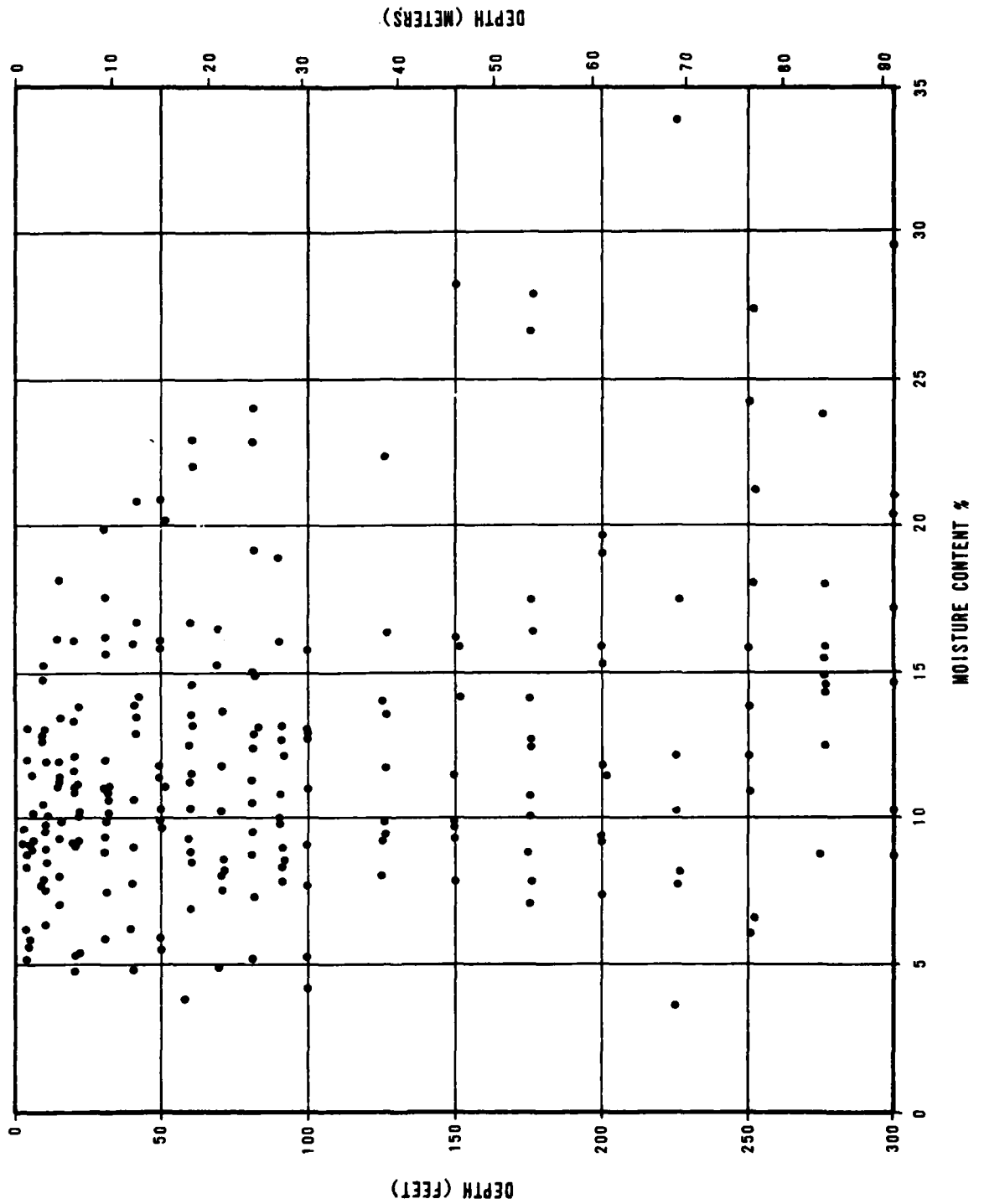


MOISTURE CONTENT vs. DEPTH,
HOLLOW-STEM AUGER (DRY) BORINGS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-69

FUGRO NATIONAL, INC.

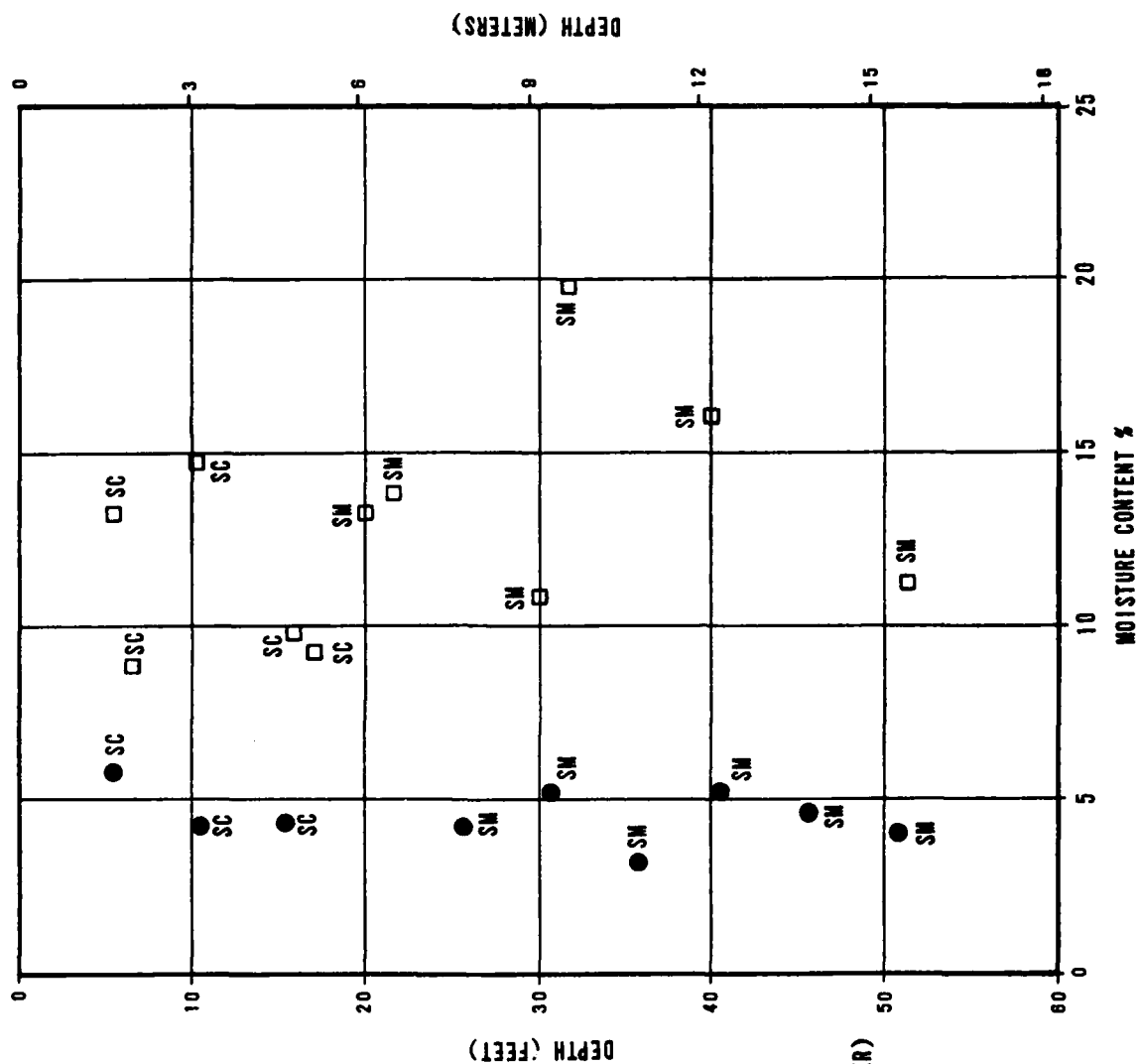


MOISTURE CONTENT vs. DEPTH,
ROTARY-WASH BORINGS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-70

FUGRO NATIONAL, INC.



EXPLANATION

● BORING LD-A-10
(HOLLOW-STEM AUGER)

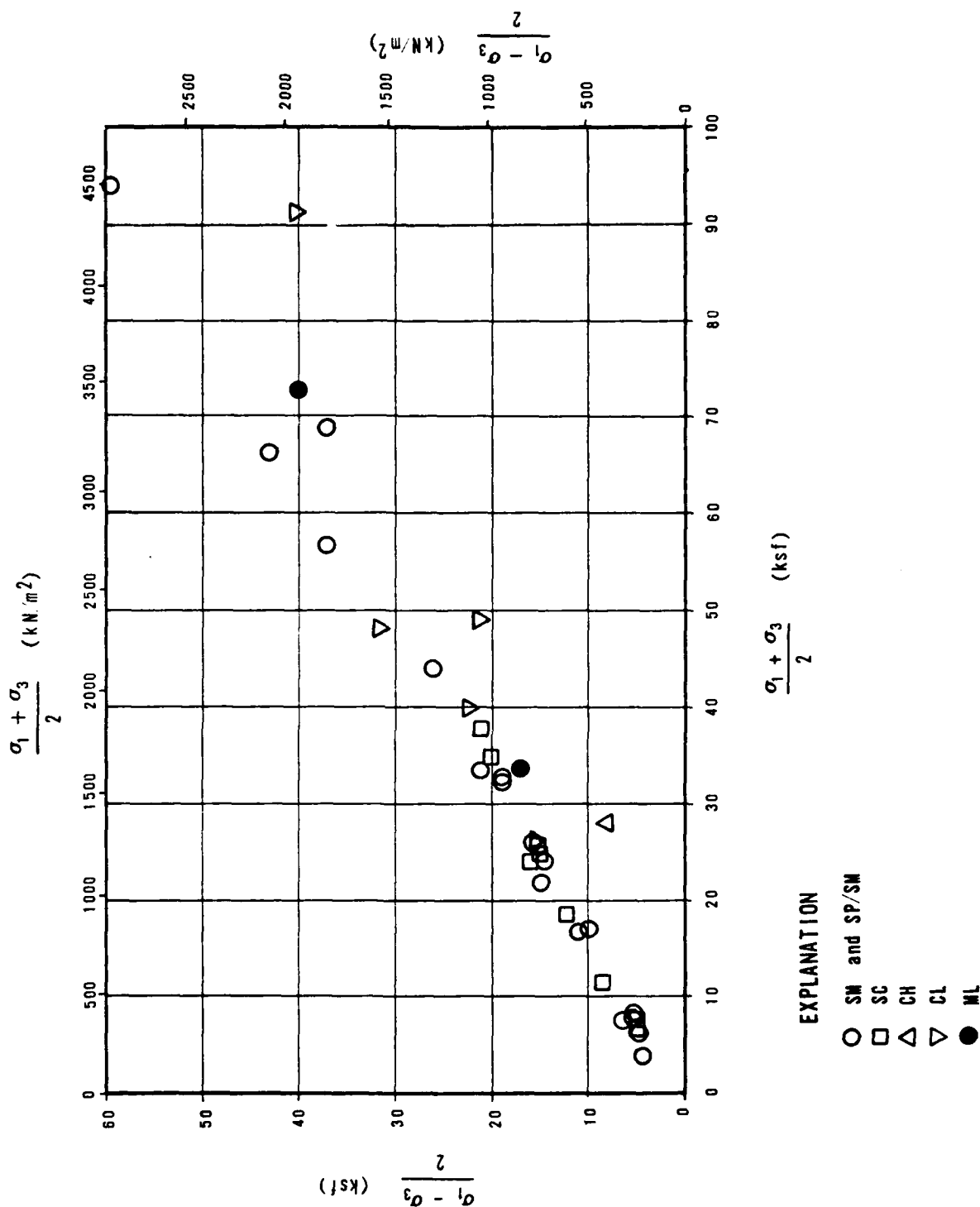
□ BORING LD-C-3
(ROTARY-WASH)

MOISTURE CONTENT vs. DEPTH,
BORINGS LD-A-10 AND LD-C-3
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-71

FUGRO NATIONAL, INC.



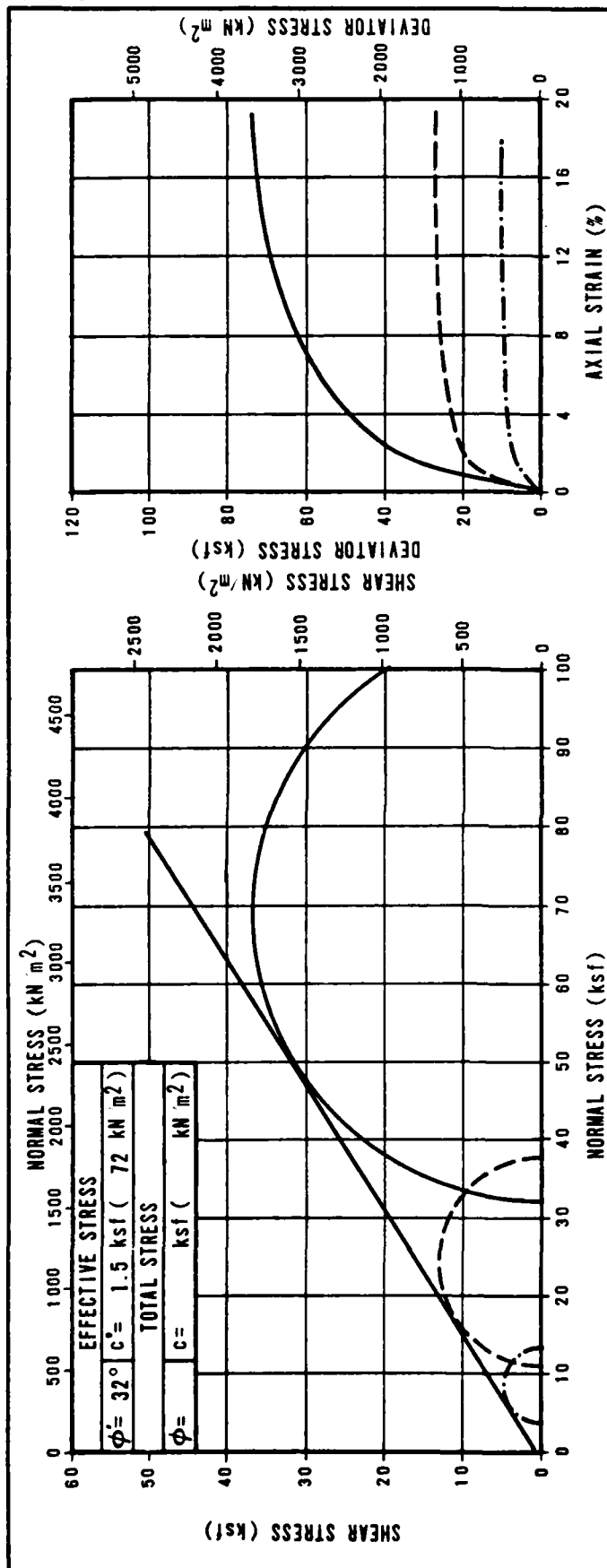
p-q DIAGRAM $\left(\frac{\sigma_1 + \sigma_3}{2} \text{ vs. } \frac{\sigma_1 - \sigma_3}{2} \right)$

LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-72

FUGRO NATIONAL, INC.



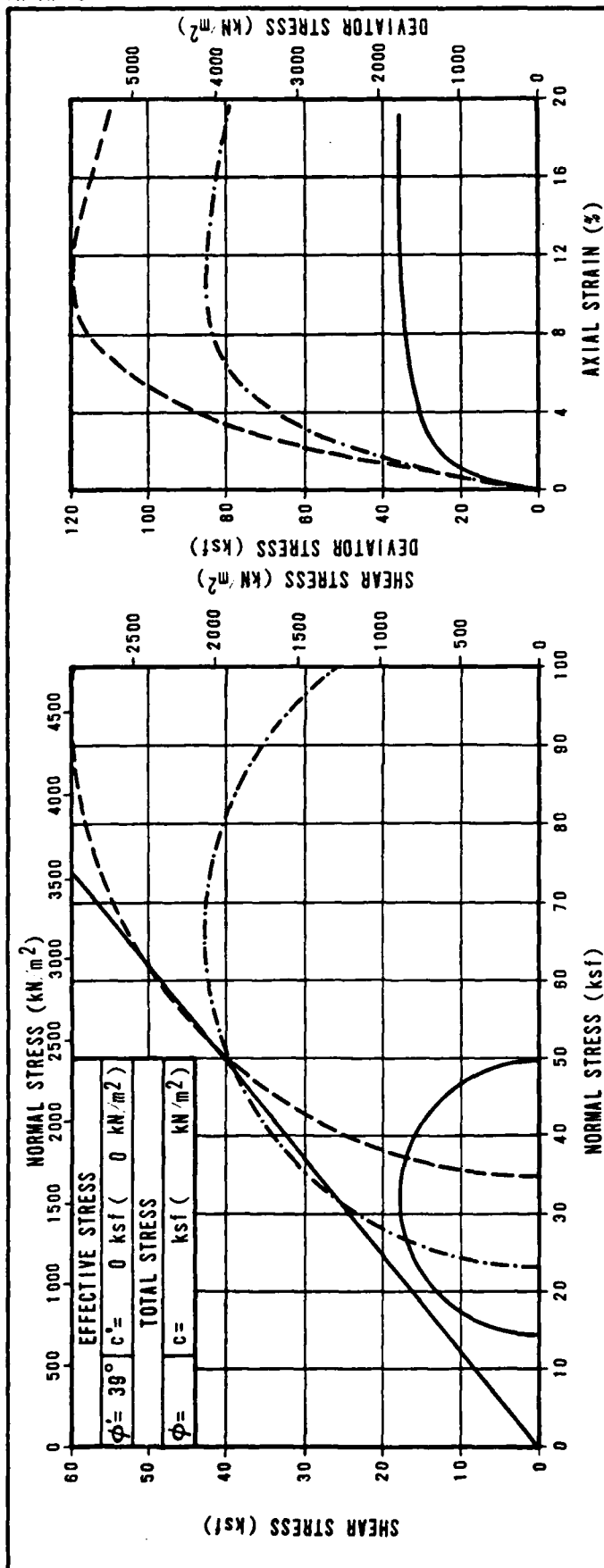
TRIAXIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-73

SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (ksf)	MAXIMUM DEVIATOR STRESS (ksf)	STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³		ksf	ksf		ksf	ksf
---	LD-0-1	P-19	275.0-275.6	83.82-84.00	SM	CD	98.6	1579	17.0	31.7	1518	0.04	0	0
---	LD-C-6	P-10	90.0-90.6	27.43-27.61	SM	CD	102.0	1634	13.5	10.4	498	0.05	0	0
---	LD-C-3	P-5	30.0-30.6	9.14-9.33	SM	CD	105.3	1607	10.8	3.5	168	0.04	0	0

UGRO NATIONAL, INC.



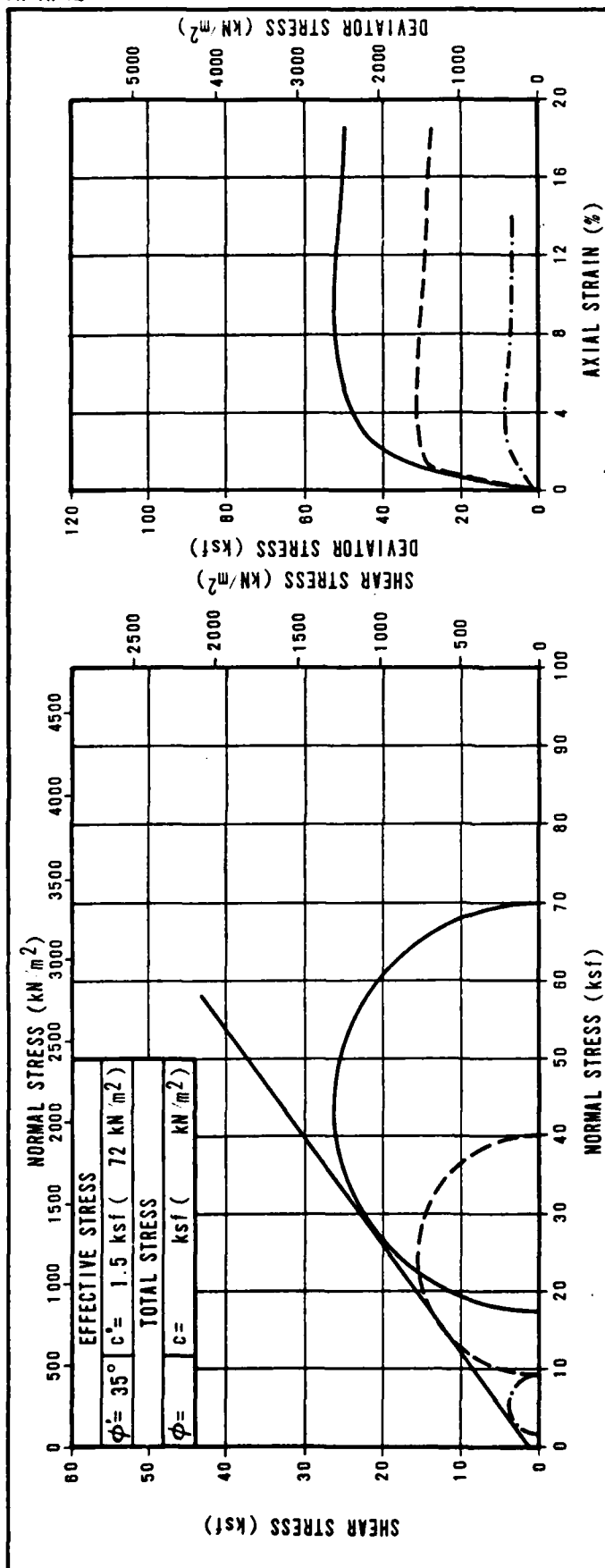
TRIAXIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-74

FUGRO NATIONAL, INC.

SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (σ_3)		MAXIMUM DEVIATOR STRESS ($\sigma_1 - \sigma_3$)	STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pct	kg/m ³		ksf	kn/m ²	ksf		ksf	kn/m ²
---	LD-0-3	P-20	300.0-300.6	91.44-91.62	SM	CD	122.6	1964	9.1	34.6	1657	118.8	0.08	0	0
---	LD-0-5	P-16	200.0-200.8	60.96-61.14	SM	CD	121.1	1939	8.8	23.0	1102	85.4	0.05	0	0
---	LD-0-2	P-12	125.8-126.2	38.28-38.47	SM	CD	108.7	1741	13.2	14.4	680	35.6	0.05	0	0



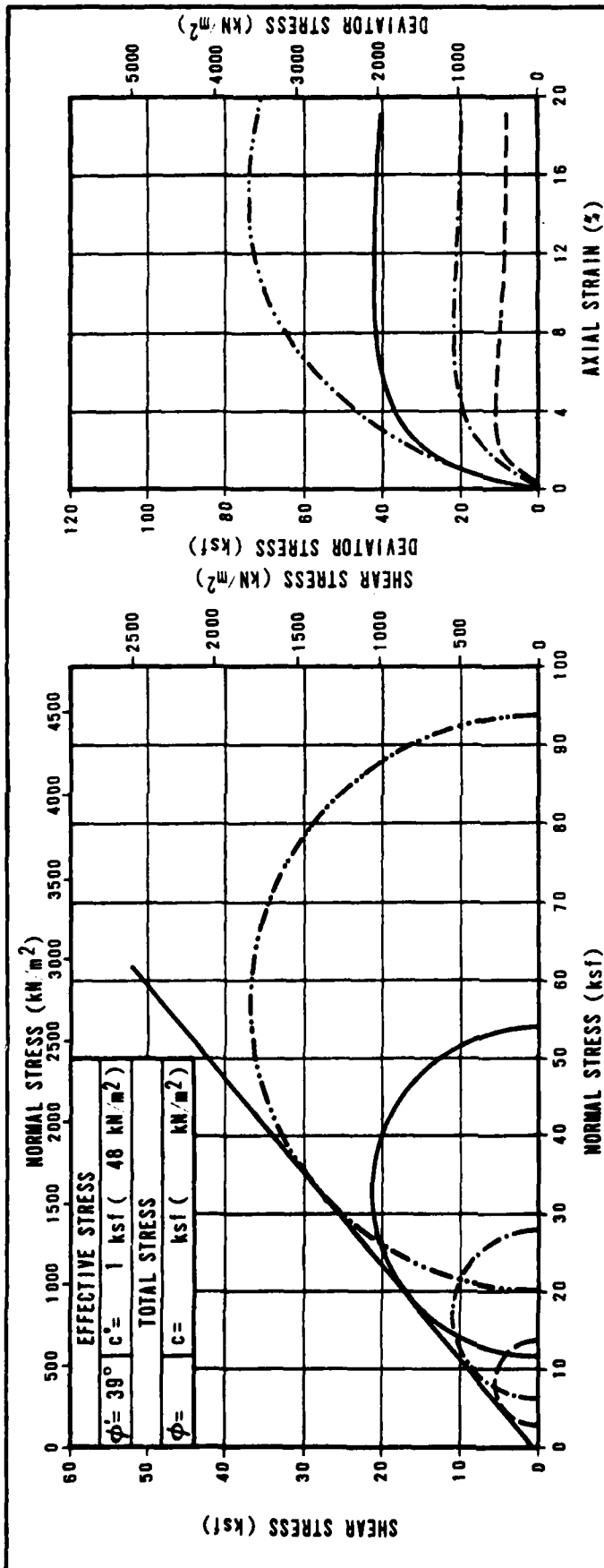
TRIAXIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-75

TUGRO NATIONAL, INC.

SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (ksf)	MAXIMUM DEVIATOR STRESS (ksf)	STRAIN RATE (%/min)	BACK PRESSURE (ksf)
---	LD-C-2	P-10	81.6-82.2	24.87-25.05	SM	CD	101.2	1621	18.5	17.3	52.5	0.04	0
---	LD-C-2	P-10	80.6-81.2	24.57-24.75	SM	CD	96.0	1538	12.1	9.2	30.8	0.04	0
---	LD-C-2	P-10	80.0-80.6	24.38-24.57	SM	CD	97.2	1557	15.0	1.7	7.7	0.03	0



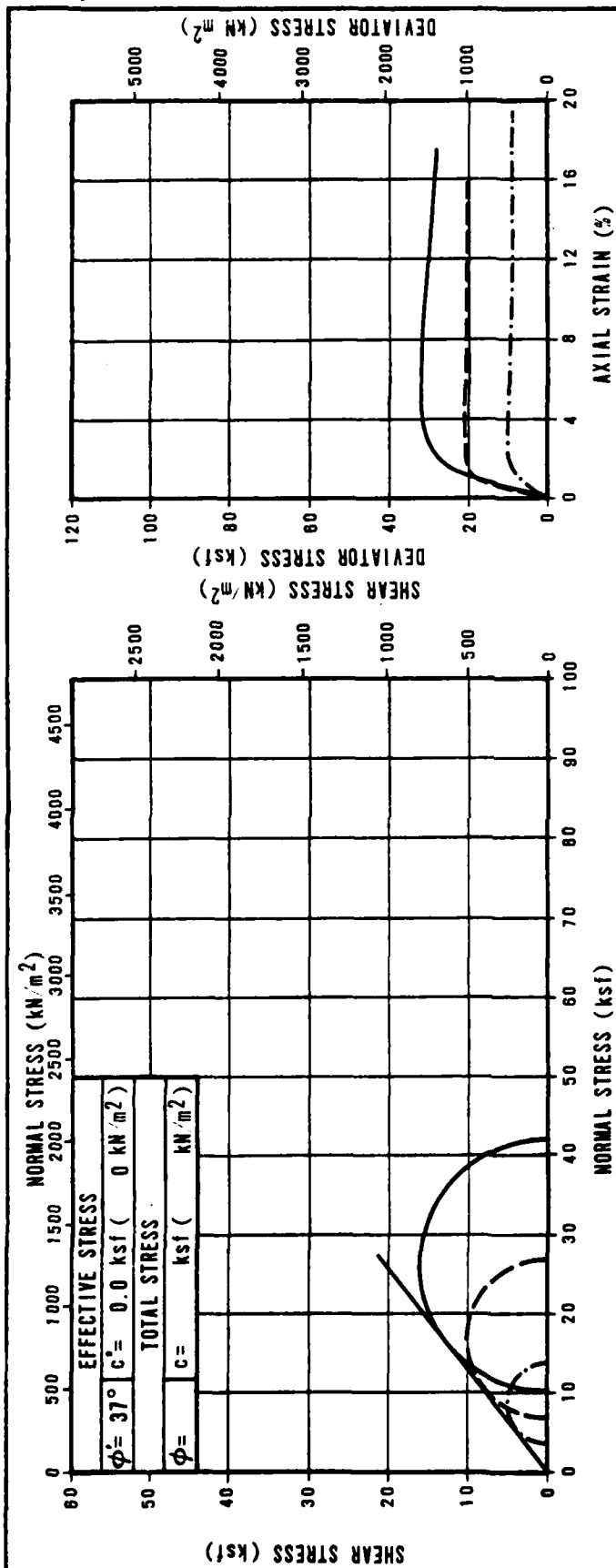
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE		MAXIMUM DEVIATOR STRESS	STRAIN RATE	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³		ksf	kn/m ²				ksf
---	LD-B-17	P-4	21.5-22.1	6.46-6.74	SW/SM	CD	115.1	1844	10.2	11.5	551	42.6	2041	0.05	0
---	LD-B-17	P-4	20.6-21.2	6.28-6.46	SM	CD	117.3	1879	9.0	2.3	110	11.2	536	0.07	0
---	LD-B-17	P-4	20.0-20.6	6.10-6.28	SW/SM	CD	122.1	1956	11.1	5.8	278	21.7	1039	0.07	0
---	LD-D-3	P-15	175.0-175.6	53.34-53.52	SW/SM	CD	117.1	1876	11.3	20.2	968	74.0	3545	0.06	0

TRIAXIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-76

FUGRO NATIONAL, INC.



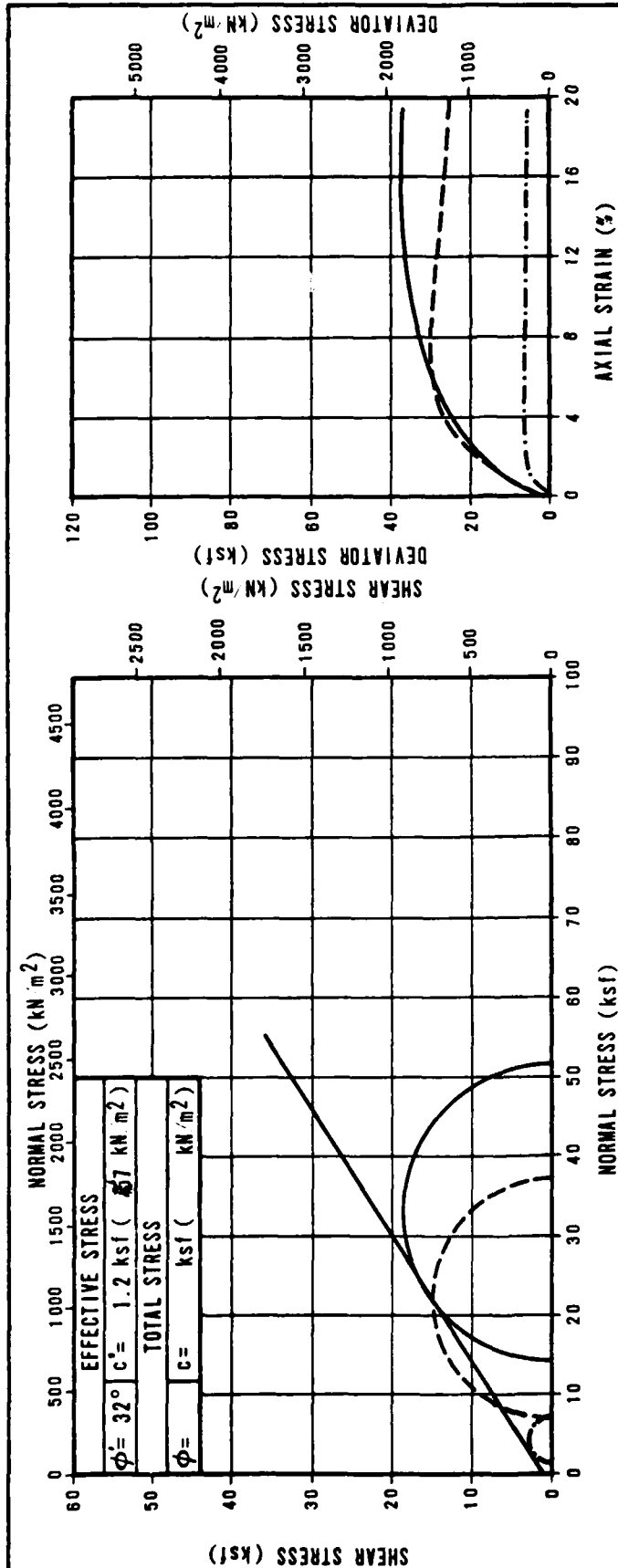
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (ksf)	MAXIMUM DEVIATOR STRESS (ksf)	STRAIN RATE (%/min)	BACK PRESSURE (ksf)
			FEET	METERS			pcf	kg/m ³		ksf	ksf		ksf
---	LD-C-1	P-10	90.0-90.6	27.43-27.61	SM	CD	110.5	1770	9.8	10.4	31.7	0.04	0
---	LD-D-2	P-7	60.0-60.6	18.29-18.47	SM	CD	106.7	1709	12.5	6.9	20.1	0.05	0
---	LD-C-6	P-4	30.0-30.6	9.14-9.33	SM	CD	96.6	1547	17.4	3.5	10.3	0.07	0

TRIAXIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-77

FUGRO NATIONAL, INC.



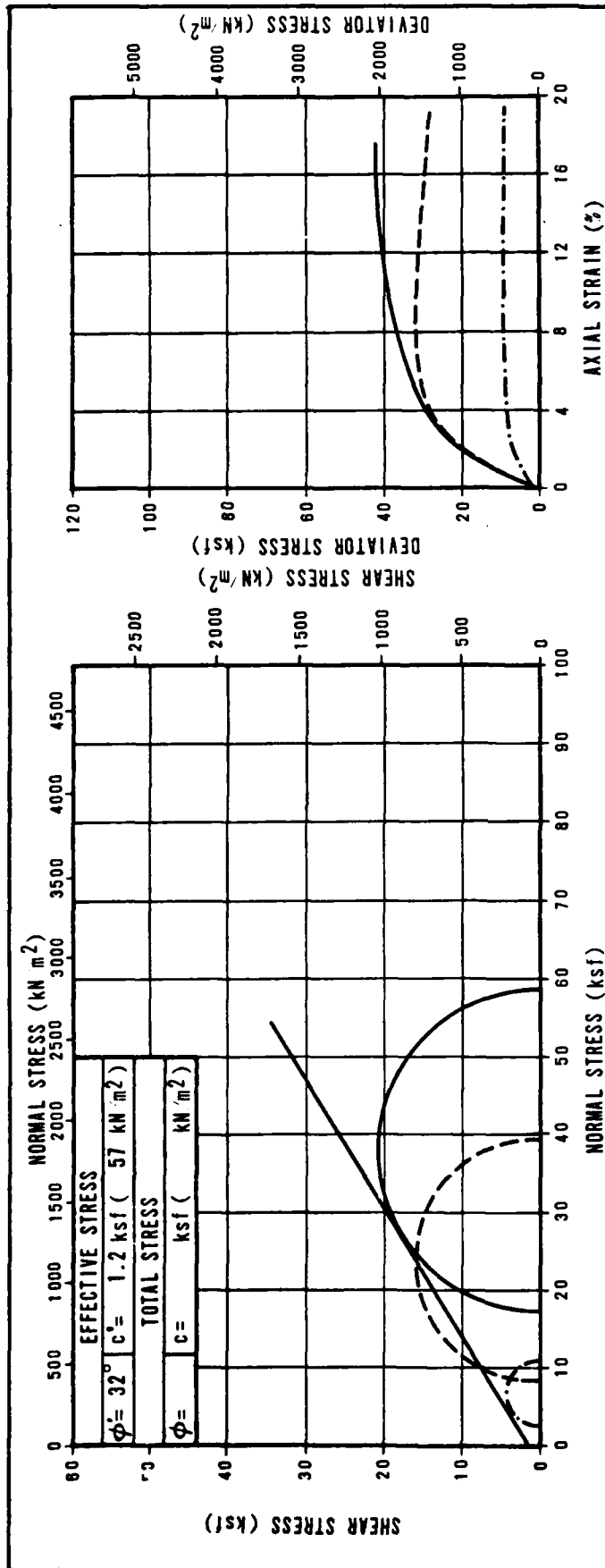
TRIAXIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-78

SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE		MAXIMUM DEVIATOR STRESS		STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³		ksf	kn/m ²	ksf	kn/m ²		ksf	kn/m ²
---	LD-0-3	P-8	60.0-60.6	18.29-18.47	SM	CD	113.1	1812	10.9	14.4	690	37.4	1791	0.07	0	0
---	LD-0-3	P-8	61.8-62.2	18.78-18.96	SM	CD	124.1	1988	8.6	7.2	345	30.0	1437	0.07	0	0
---	LD-0-3	P-8	60.8-61.2	18.47-18.65	SM	CD	117.9	1889	11.4	1.4	67	6.0	287	0.07	0	0

FUGRO NATIONAL, INC.



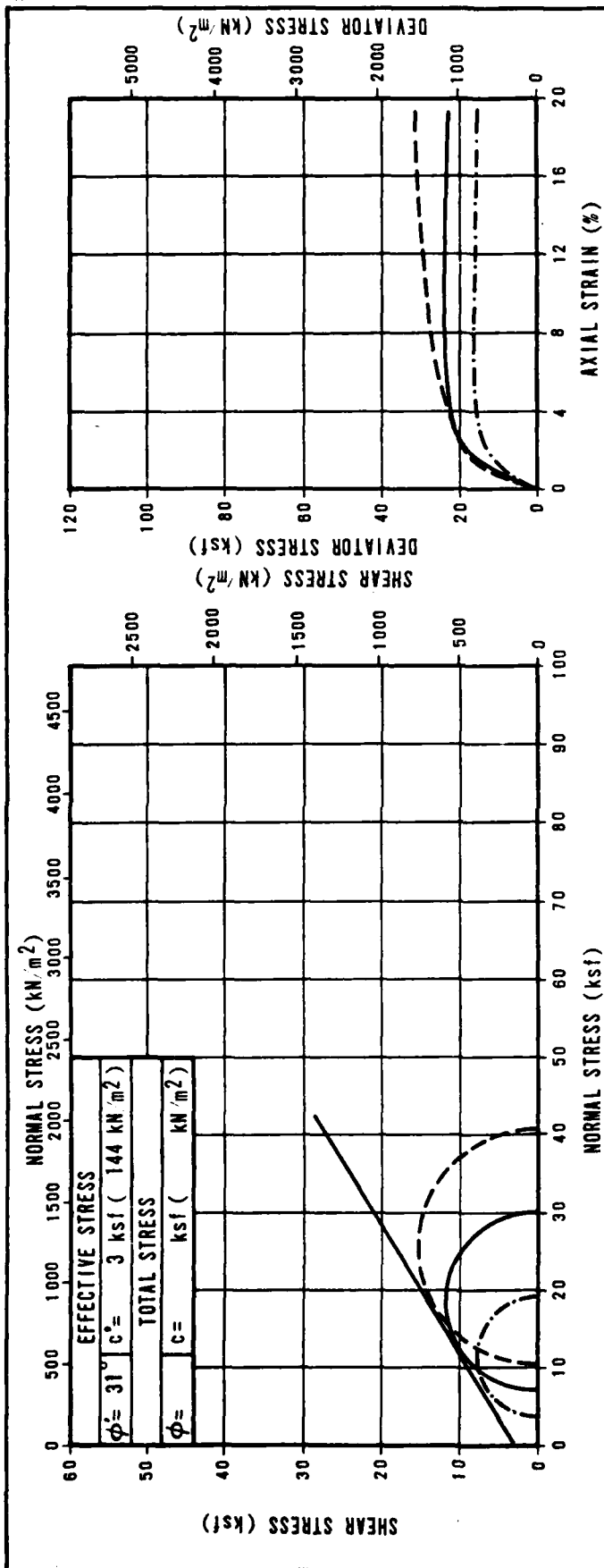
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (ksf)	MAXIMUM DEVIATOR STRESS (ksf)	STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³					ksf	KN/m ²
---	LD-C-1	P-13	151.6-152.1	46.21-46.36	SC	CD	103.3	1655	11.7	17.3	41.5	1988	0	0
---	LD-C-4	P-9	70.0-70.6	21.34-21.52	SC	CD	120.1	1924	11.6	8.1	388	1499	0	0
---	LD-B-1	P-4	20.0-20.6	6.10-6.28	SC	CD	117.0	1874	9.1	2.3	110	407	0	0

TRIAXIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-79

FUGRO NATIONAL, INC.



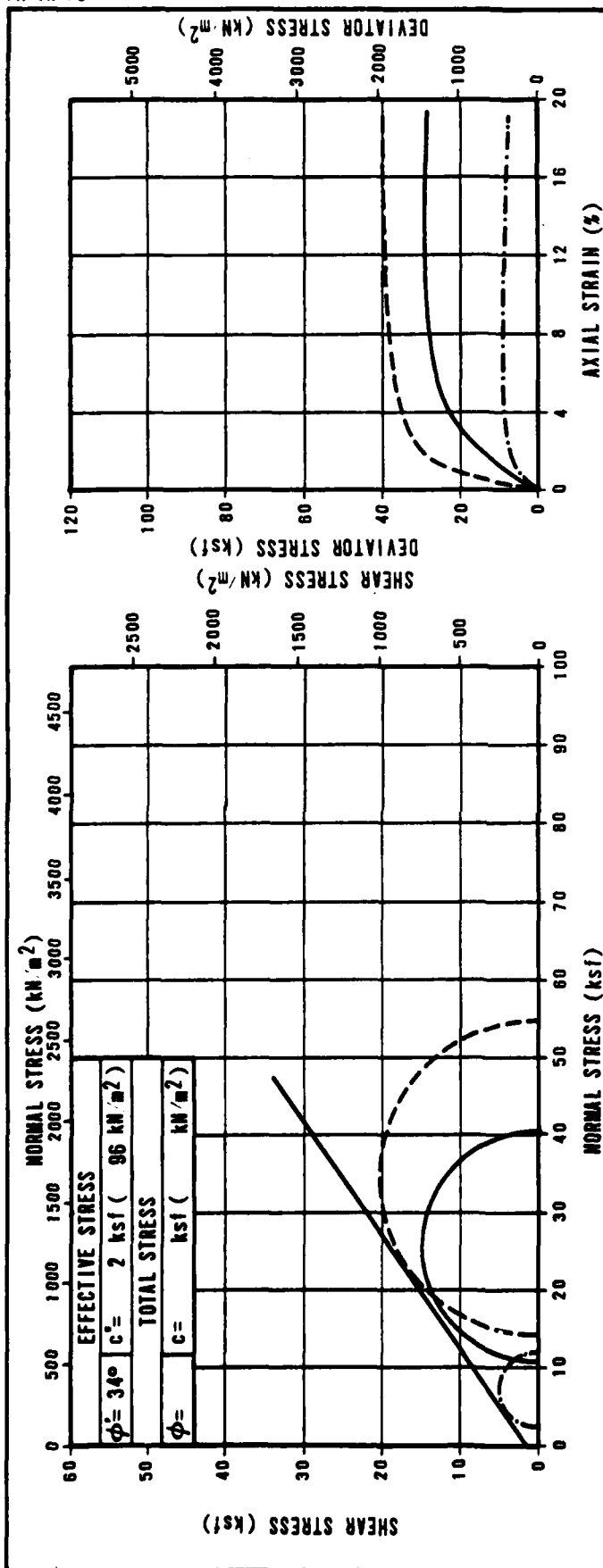
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE		MAXIMUM DEVIATOR STRESS $\sigma_1 - \sigma_3$	STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³		ksf	kn/m ²			ksf	kn/m ²
---	LD-D-1	P-8	60.1-60.7	18.32-18.50	SC	CD	103.5	1658	6.7	6.9	331	23.4	1121	0.04	0
---	LD-C-3	P-11	90.0-90.6	27.43-27.61	SC	CD	109.6	1756	12.6	10.4	498	30.4	1456	0.05	0
---	LD-D-3	P-5	30.0-30.6	9.14-9.33	SC	CD	116.1	1860	9.8	3.5	168	15.6	747	0.05	0

TRIAXIAL SHEAR TEST RESULTS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS

FIGURE
C-8C

FUGRO NATIONAL, INC.



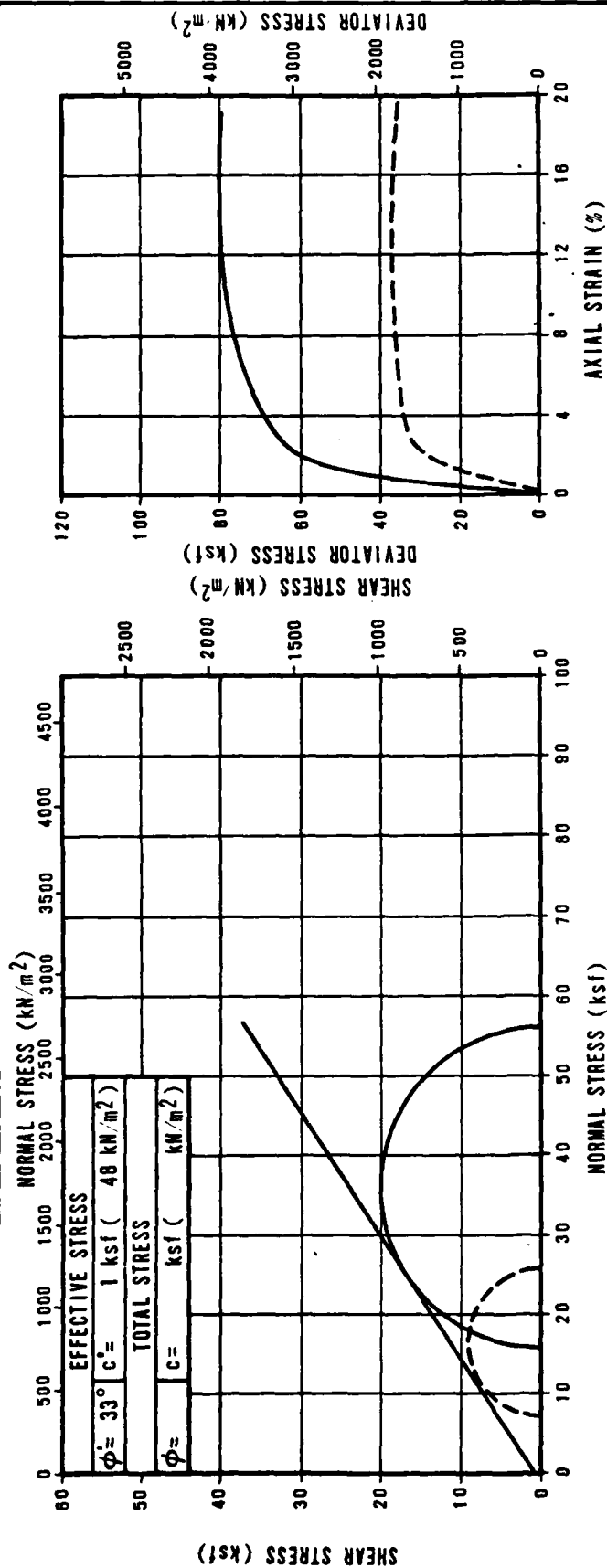
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE		MAXIMUM DEVIATOR STRESS		STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³		ksf	kn/m ²	ksf	kn/m ²		ksf	kn/m ²
---	LD-C-5	P-10	80.0-80.6	24.38-24.57	SC	CD	113.5	1818	12.7	10.4	498	28.8	1427	0.05	0	0
---	LD-B-1	P-8	60.7-61.3	18.50-18.68	SC	CD	105.2	1685	8.2	13.8	661	40.6	1945	0.07	0	0
---	LD-C-4	P-4	20.0-20.6	6.10-6.28	SC	CD	120.9	1937	6.4	2.3	110	9.5	455	0.07	0	0

TRIAXIAL SHEAR TEST RESULTS
 LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 C-81

FUGRO NATIONAL, INC.



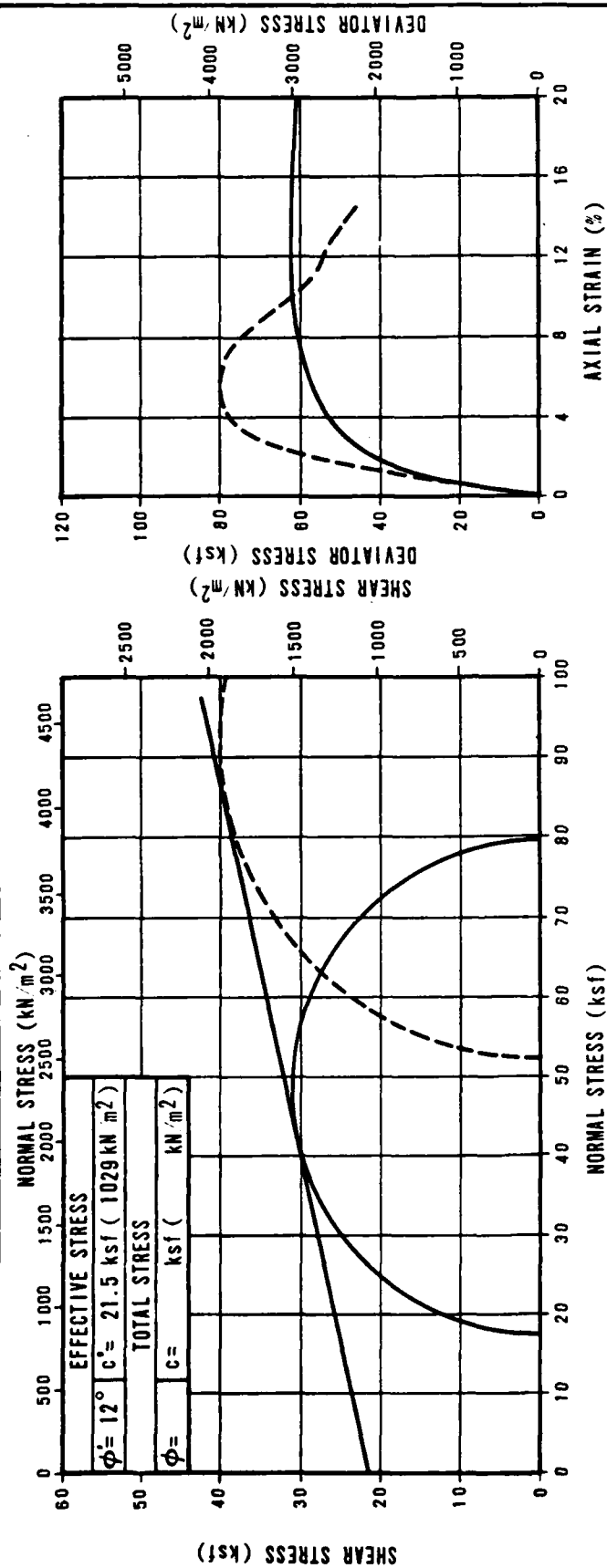
TRIAxIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-82

SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (ksf)	MAXIMUM DEVIATOR STRESS (ksf)	STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³					ksf	kn/m ²
---	LD-D-2	P-10	275.0-275.6	83.82-84.00	ML	CD	108.1	1732	12.1	31.7	1518	80.5	3856	0
---	LD-C-6	P-12	125.0-125.6	38.10-38.28	ML	CD	99.6	1595	13.0	14.4	690	37.2	1782	0

TUGRO NATIONAL, INC.



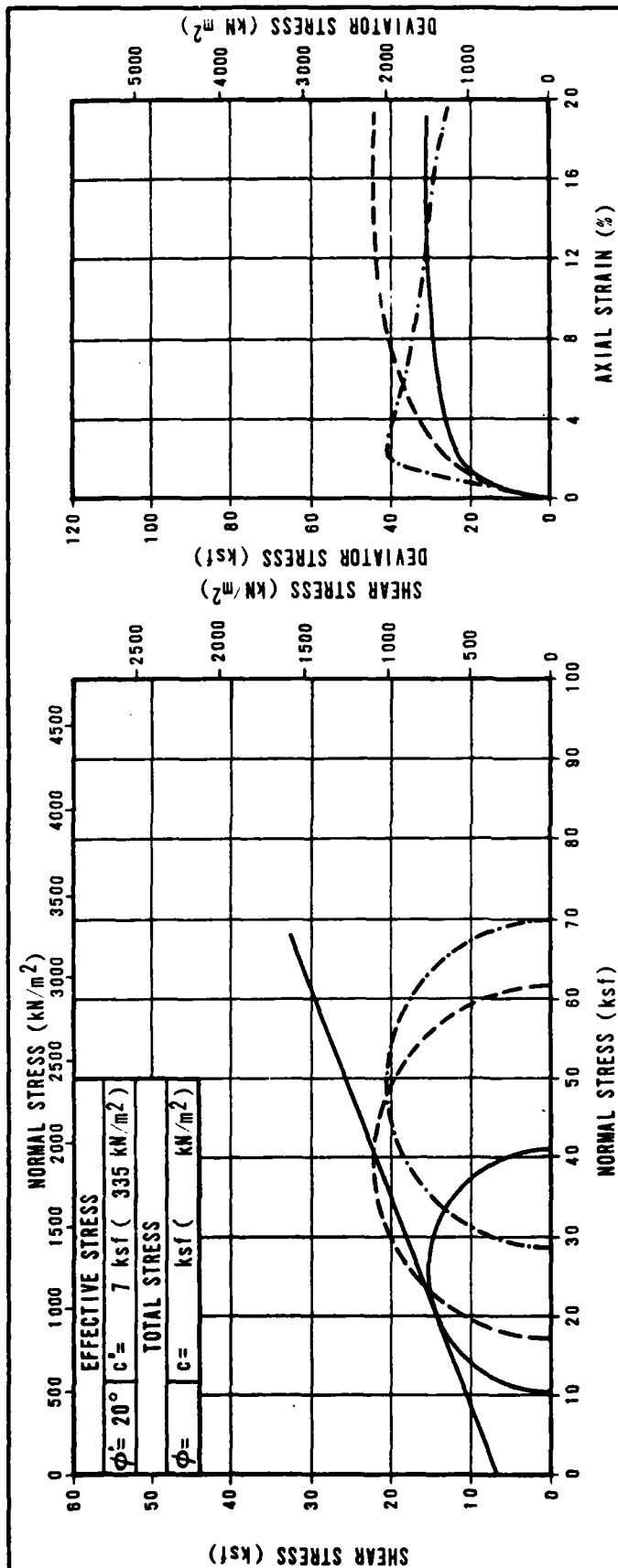
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (σ_3)		MAXIMUM DEVIATOR STRESS ($\sigma_1 - \sigma_3$)	STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³		ksf	kn/m ²	ksf	kn/m ²	ksf	kn/m ²
—	LD-C-3	P-14	150.0-150.6	45.72-45.90	CL	CD	104.7	1677	11.5	17.3	829	62.3	2984	0	0
---	LD-D-1	P-23	450.0-450.6	137.16-137.34	CL	CD	111.0	1778	16.2	51.8	2481	79.8	3822	0	0

TRIAxIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-83

FUGRO NATIONAL, INC.



TRIAXIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

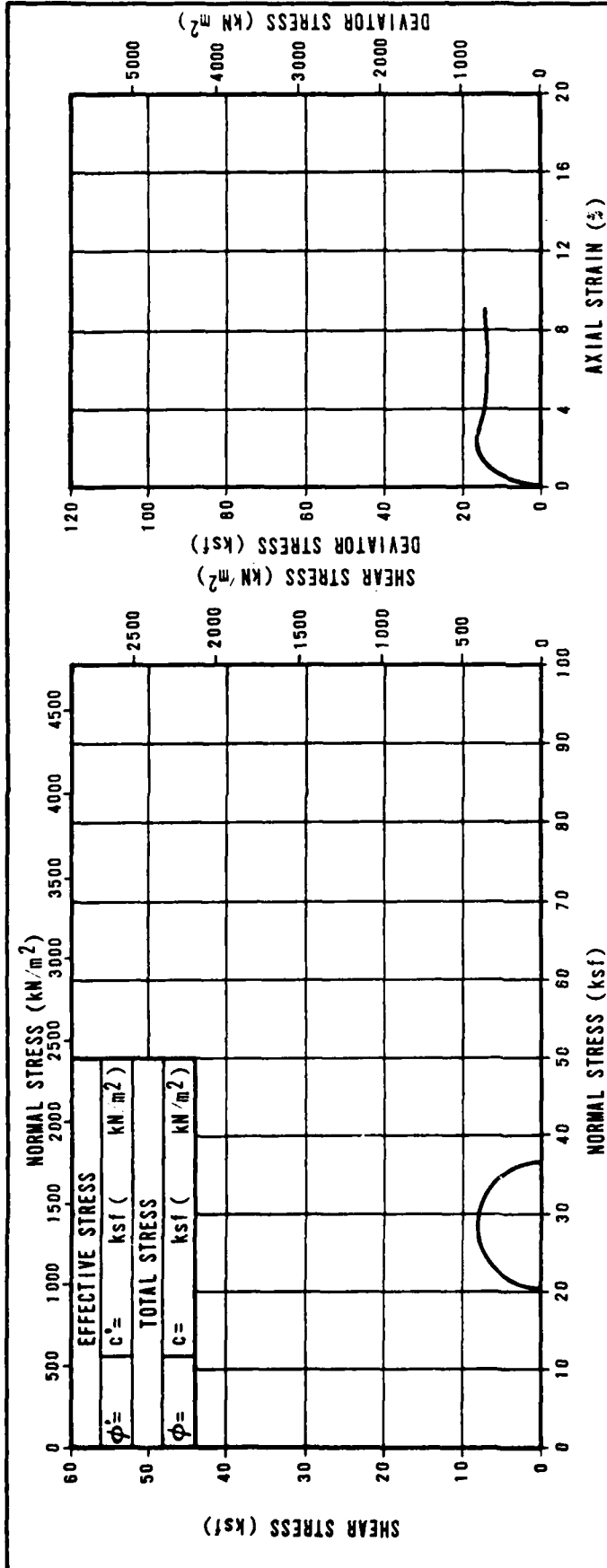
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-84

SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	TYPE OF TEST	DRY DENSITY		MOISTURE CONTENT (%)	CONFINING PRESSURE (σ_3)		MAXIMUM DEVIATOR STRESS ($\sigma_1 - \sigma_3$)		STRAIN RATE (%/min)	BACK PRESSURE	
			FEET	METERS			pcf	kg/m ³		ksf	kN/m ²	ksf	kN/m ²		ksf	kN/m ²
---	LD-0-1	P-11	90.0-90.6	27.43-27.61	CL	CD	101.9	1632	6.6	10.4	498	30.7	1471	0.04	0	0
---	LD-0-1	P-14	150.0-150.6	45.72-45.90	CL	CD	103.5	1658	5.7	17.3	829	44.5	2132	0.04	0	0
---	LD-C-3	P-18	251.0-251.6	76.50-76.69	CL	CD	106.1	1700	18.1	28.8	1380	41.3	1978	0.05	0	0

FUGRO NATIONAL, INC.

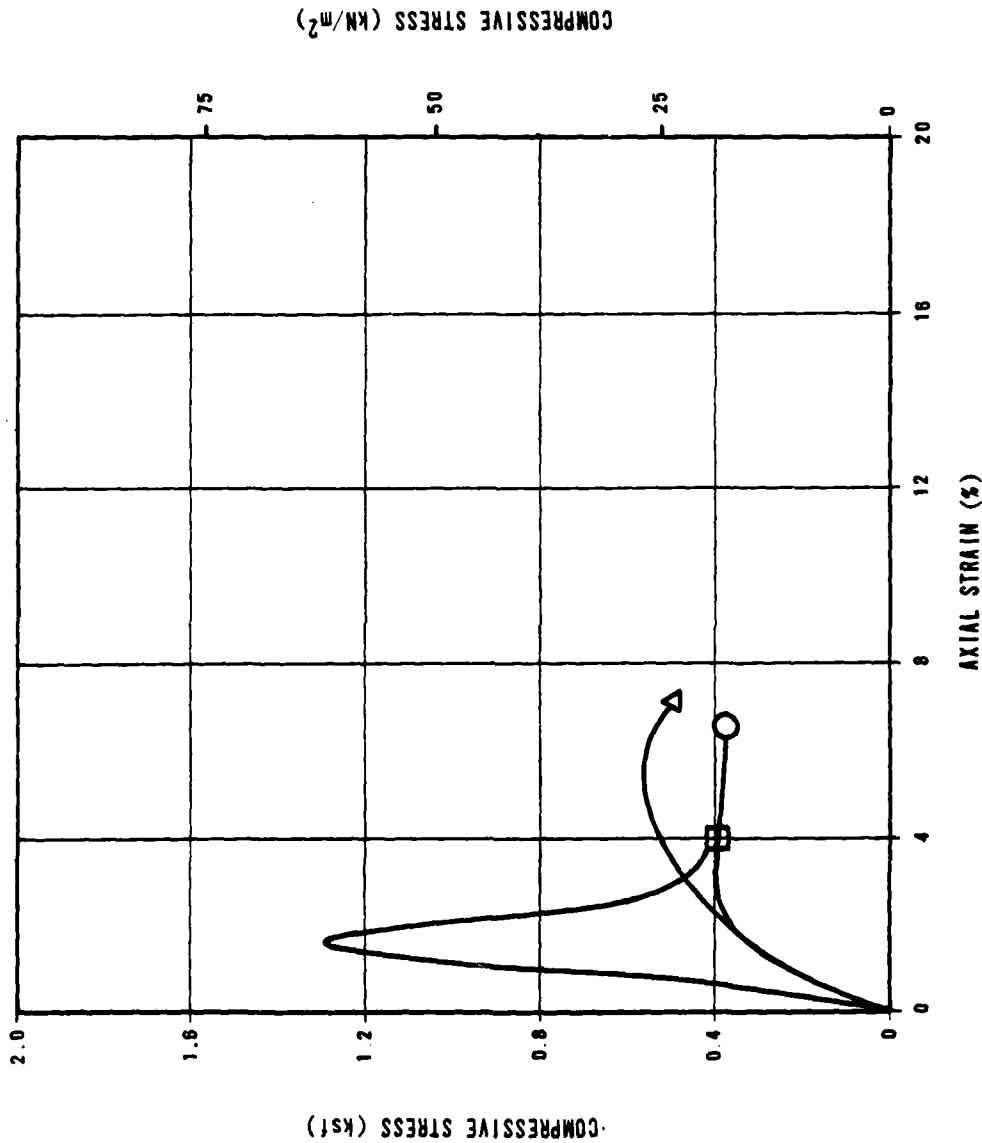


TRIAxIAL SHEAR TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-85

FUGRO NATIONAL, INC.



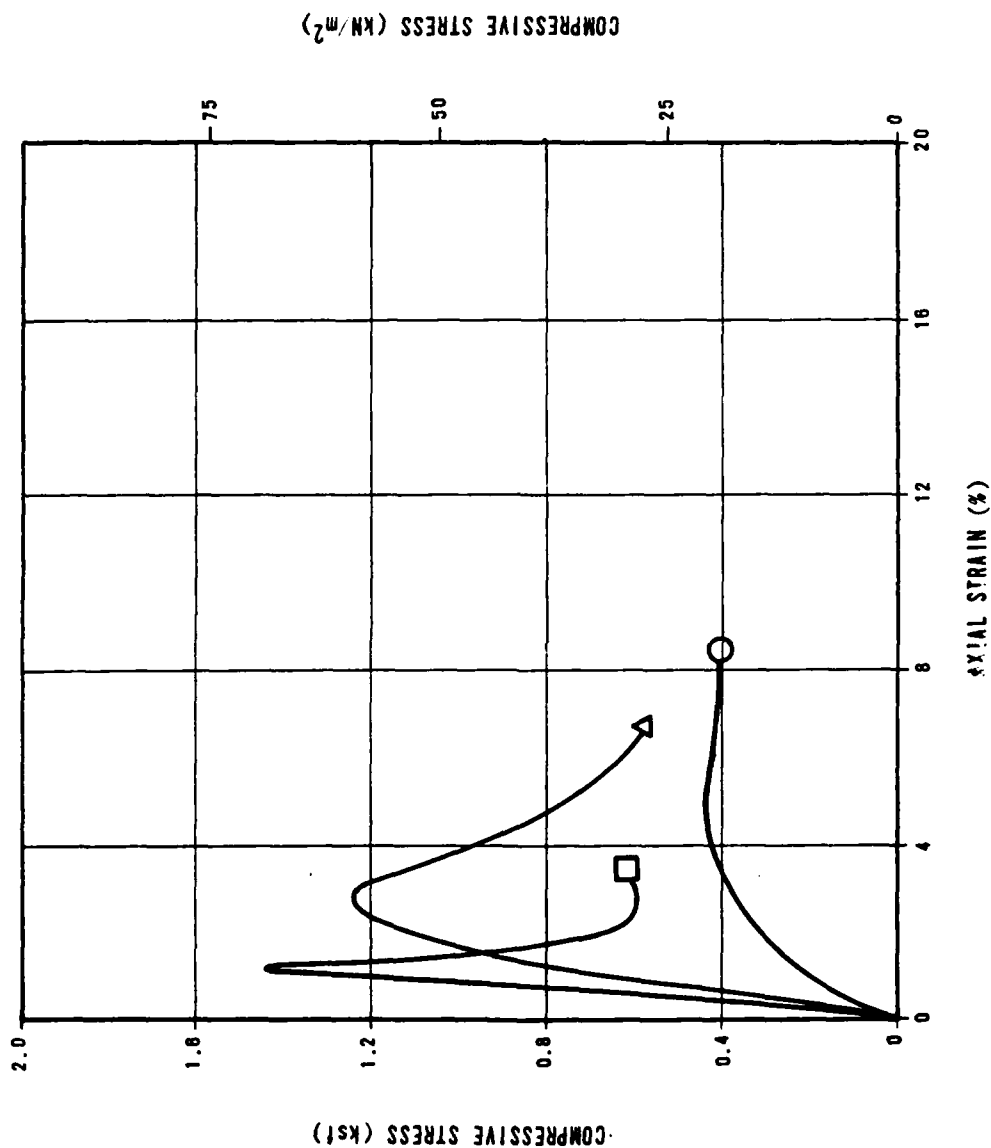
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT / DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-C-1	P-3	21.1-21.7	8.43-6.62	SM	0.4	19	117.3	1879	9.3	72.0	2.4
△	LD-C-3	P-4	20.0-20.6	6.10-6.28	SM	0.6	29	109.3	1751	13.3	68.0	2.4
□	LD-D-1	P-18	250.0-250.6	76.25-76.43	SM	1.3	62	101.8	1631	13.9	82.1	2.0

UNCONFINED COMPRESSION TEST RESULTS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-86

FUGRO NATIONAL, INC.



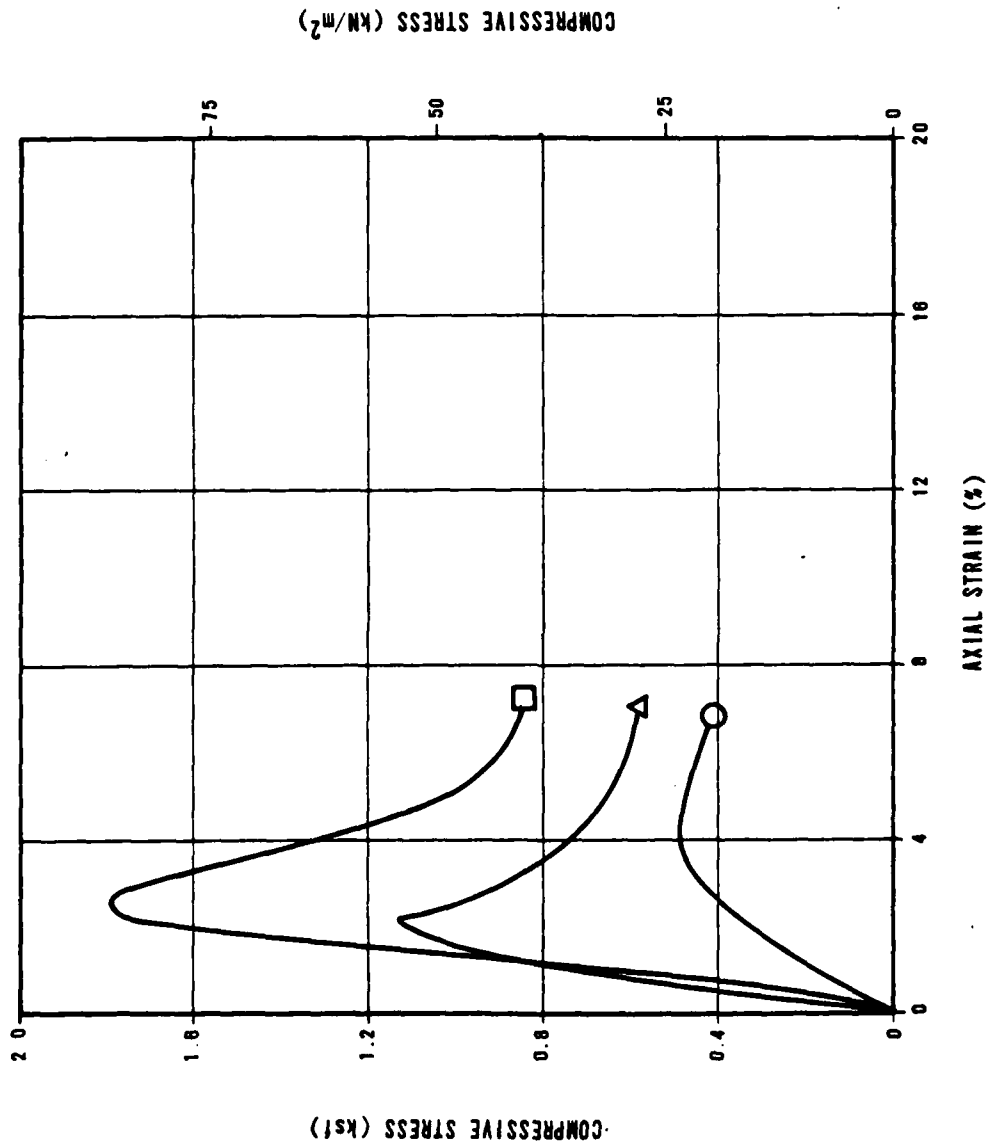
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT / DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-C-2	P-3	15.0-15.6	4.57-4.76	SM	0.4	19	108.4	1736	16.0	78.2	2.4
△	LD-D-2	P-1	10.6-11.2	3.23-3.42	SM	1.2	57	117.7	1885	8.8	59.9	2.4
□	LD-D-2	P-5	40.0-40.6	12.20-12.38	SM	1.5	72	104.7	1677	13.5	72.5	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-87

FUGRO NATIONAL, INC.



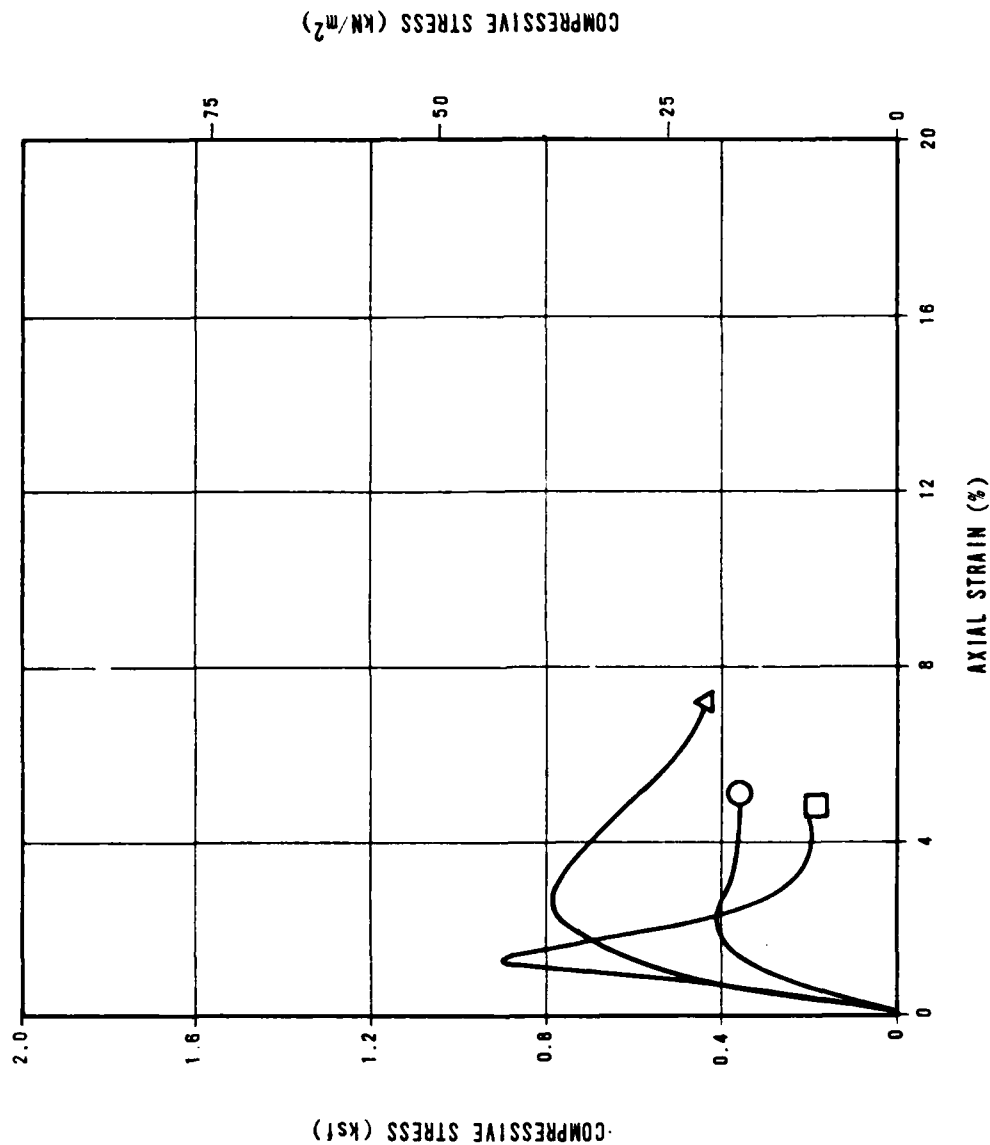
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT/DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-C-1	P-1	5.6-8.2	1.70-1.89	SC/SM	0.5	24	118.6	1900	9.3	69.3	2.4
△	LD-C-8	P-2	10.6-11.2	3.23-3.42	SM/SC	1.1	53	114.4	1833	8.5	51.5	2.4
□	LD-B-18	D-5	10.5-11.0	3.20-3.35	SM/SC	1.8	86	109.1	1748	6.4	30.0	2.2

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-88

FUGRO NATIONAL, INC.



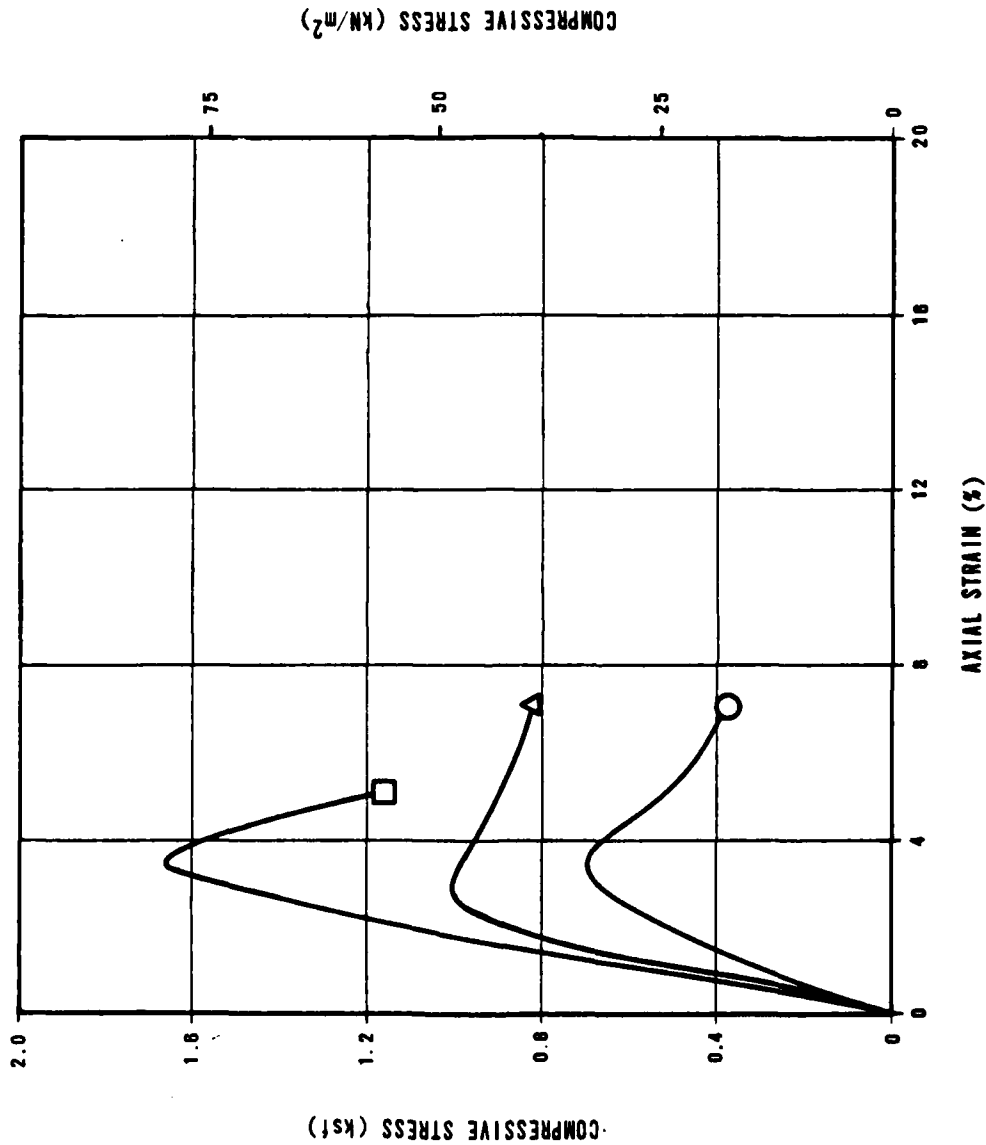
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT / DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-8-1	P-5	30.0-30.6	9.15-9.33	SC/SW	0.4	19	115.4	1849	9.9	67.6	2.4
△	LD-8-1	P-3	15.0-15.6	4.57-4.76	SC/SW	0.8	38	119.0	1906	11.1	75.7	2.4
□	LD-8-1	D-1	5.5-8.0	1.68-1.83	SC/SW	0.9	43	118.7	1901	1.4	9.0	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMSO

FIGURE
C-89

FUGRO NATIONAL, INC.



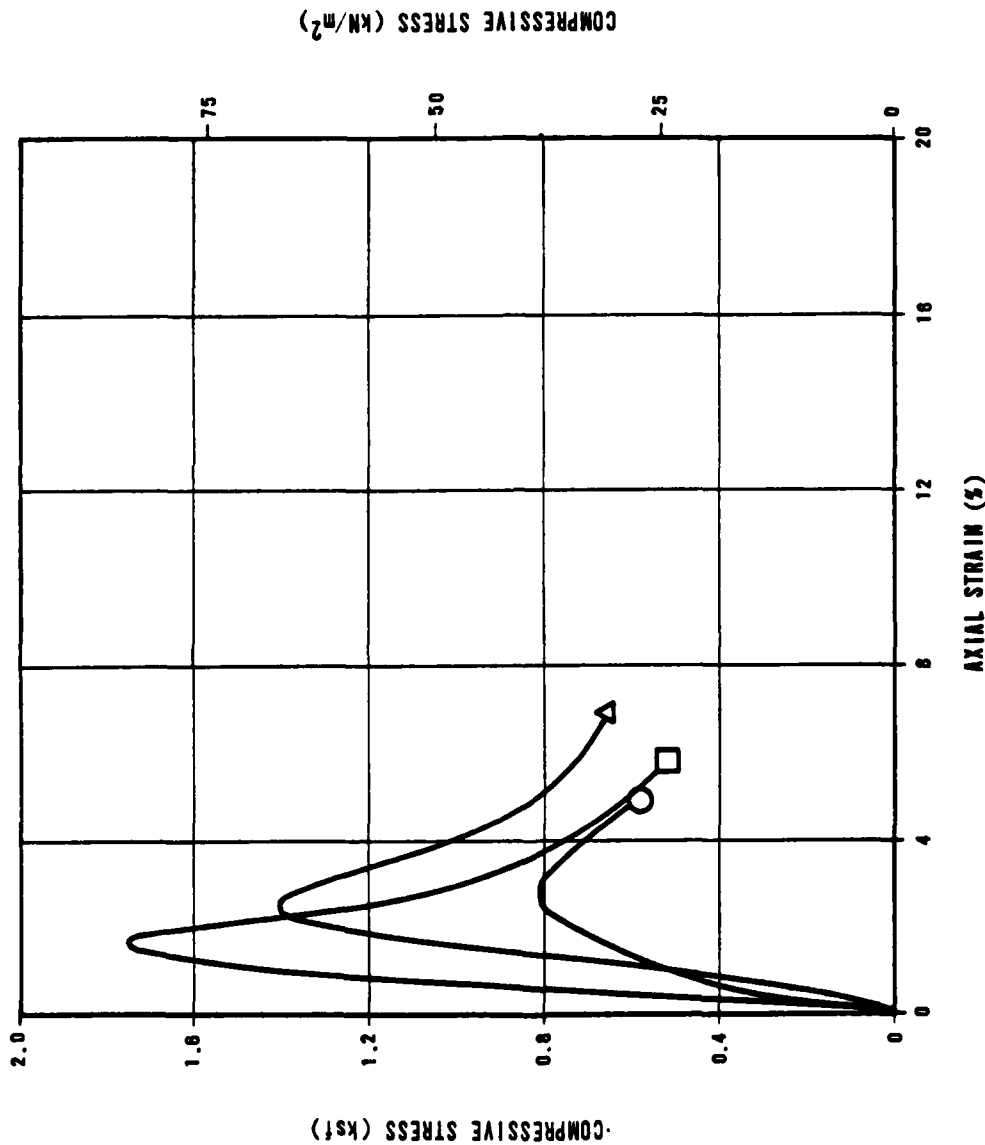
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT OF DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
□	LD-C-3	P-10	80.0-80.6	24.40-24.58	SC	0.7	34	114.6	1836	11.4	81.7	2.4
△	LD-C-5	P-6	40.0-40.6	12.20-12.38	SC	1.0	48	110.6	1772	13.9	80.6	2.1
○	LD-C-4	P-1	5.0-5.6	1.53-1.71	SC	1.7	81	118.0	1890	9.2	71.1	2.4

UNCONFINED COMPRESSION TEST RESULTS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-90

FUGRO NATIONAL, INC.



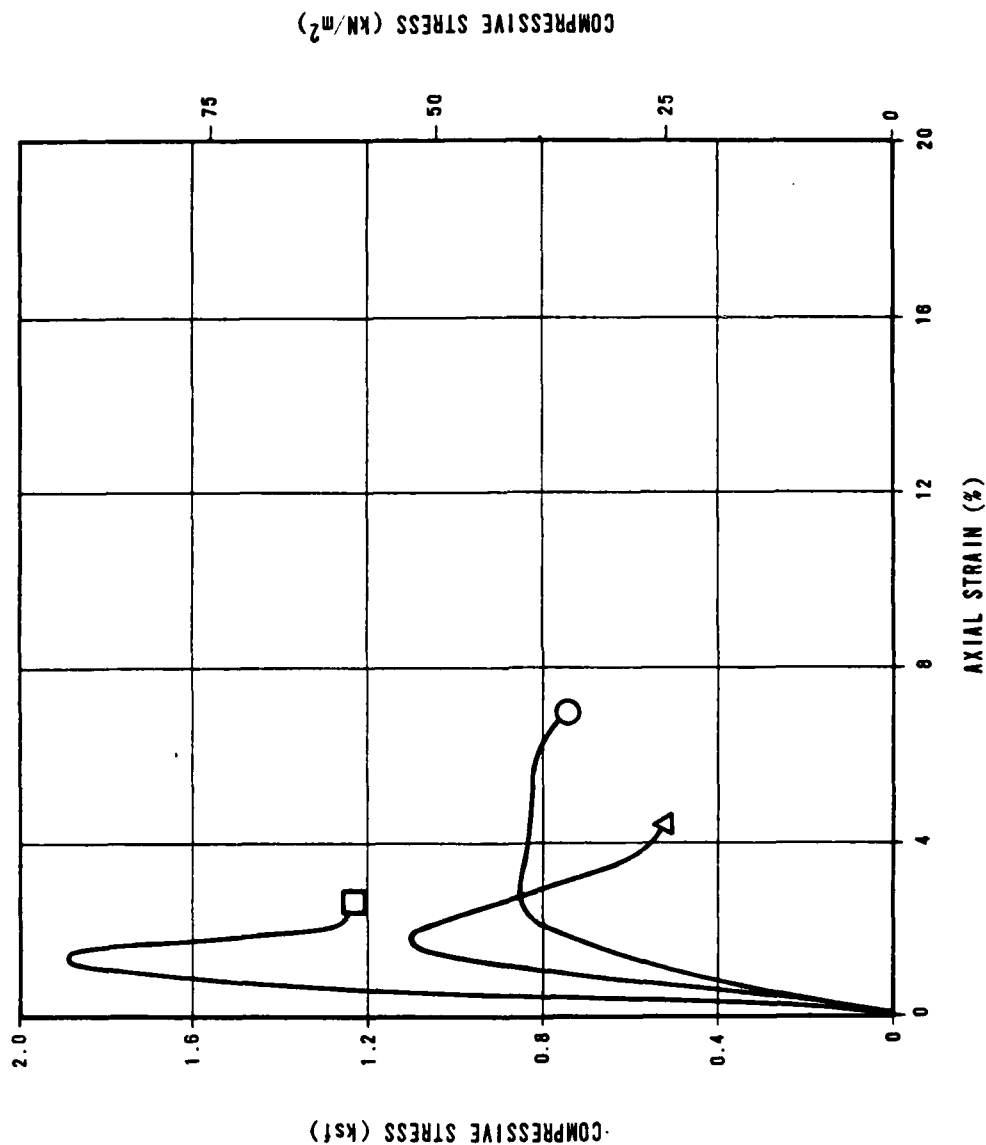
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT/DIAMETER
			FEET	METERS		ksf	lb/ft ²	pcf	kg/m ³			
○	LD-D-3	P-7	50.0-50.6	15.25-15.43	SC	0.8	38	121.9	1853	9.7	84.3	2.4
△	LD-B-1	P-10	80.0-80.6	24.40-24.58	SC	1.4	67	113.1	1812	9.5	71.7	2.4
□	LD-B-12	D-3	10.5-11.0	3.20-3.35	SC	1.8	86	122.7	1905	2.5	18.2	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-91

FUGRO NATIONAL, INC.



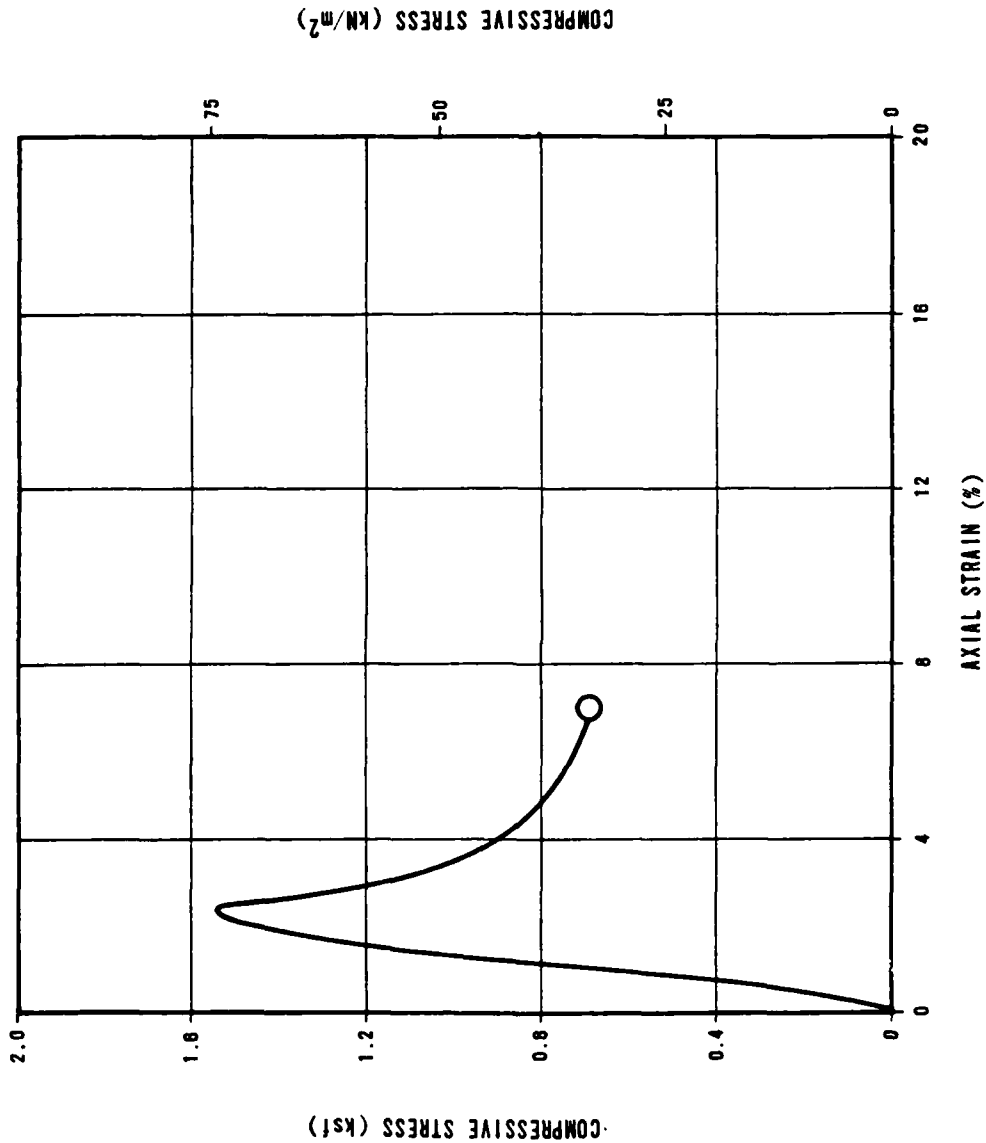
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-A-6	D-5	20.5-21.0	6.25-6.40	SC	0.9	43	115.5	1850	3.2	18.6	2.4
△	LD-C-5	P-8	60.6-61.2	18.48-18.67	SC	1.1	53	115.0	1842	8.7	66.3	2.4
□	LD-C-3	P-3	15.8-16.2	4.76-4.94	SC	1.9	91	114.6	1836	8.8	68.2	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-92

FUGRO NATIONAL, INC.



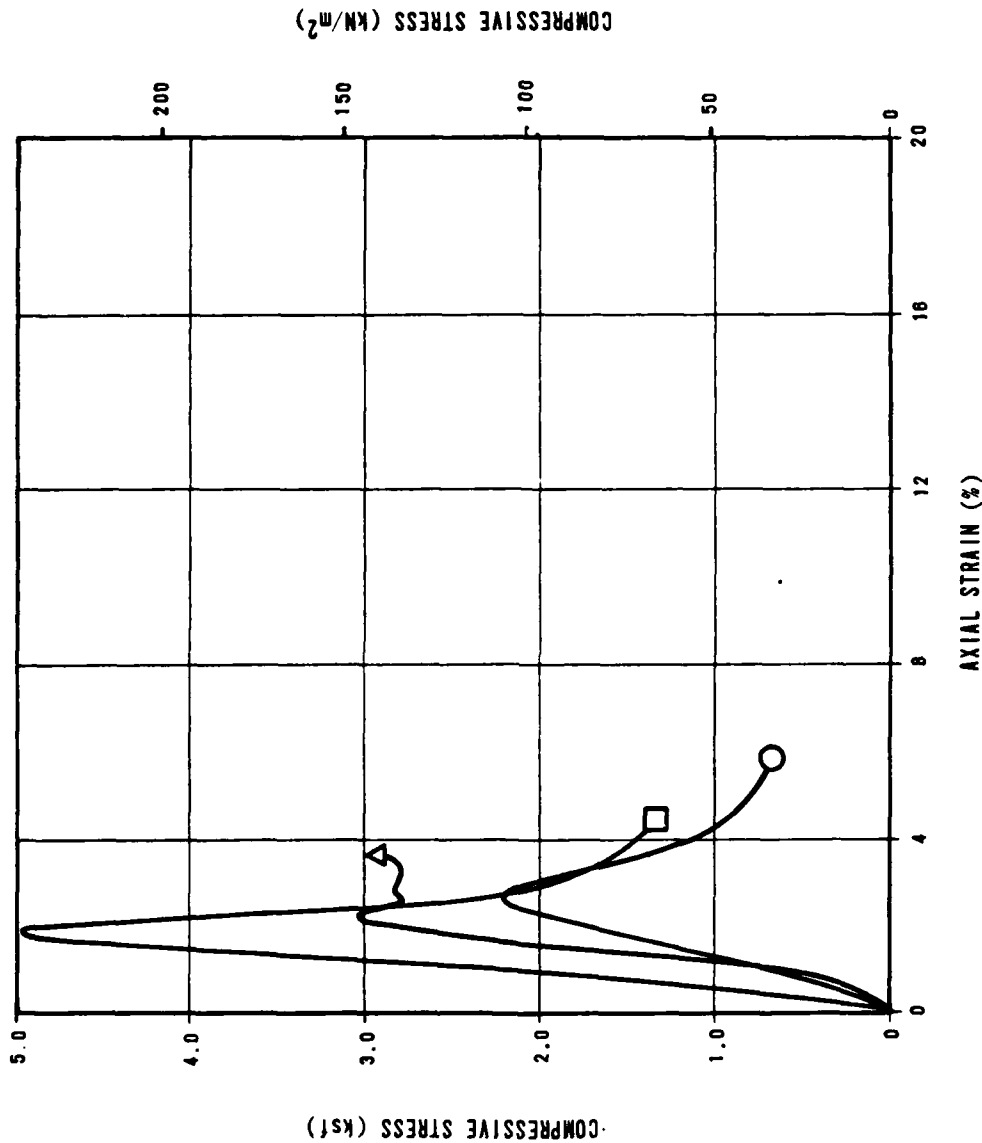
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT / DIAMETER
			FEET	METERS		ksf	kn/m ²	pcf	kg/m ³			
—○—	LD-C-5	P-4	20.0-20.6	6.10-6.28	CL	1.6	77	104.4	1672	16.0	57.6	2.1

UNCONFINED COMPRESSION TEST RESULTS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-93

FUGRO NATIONAL, INC.



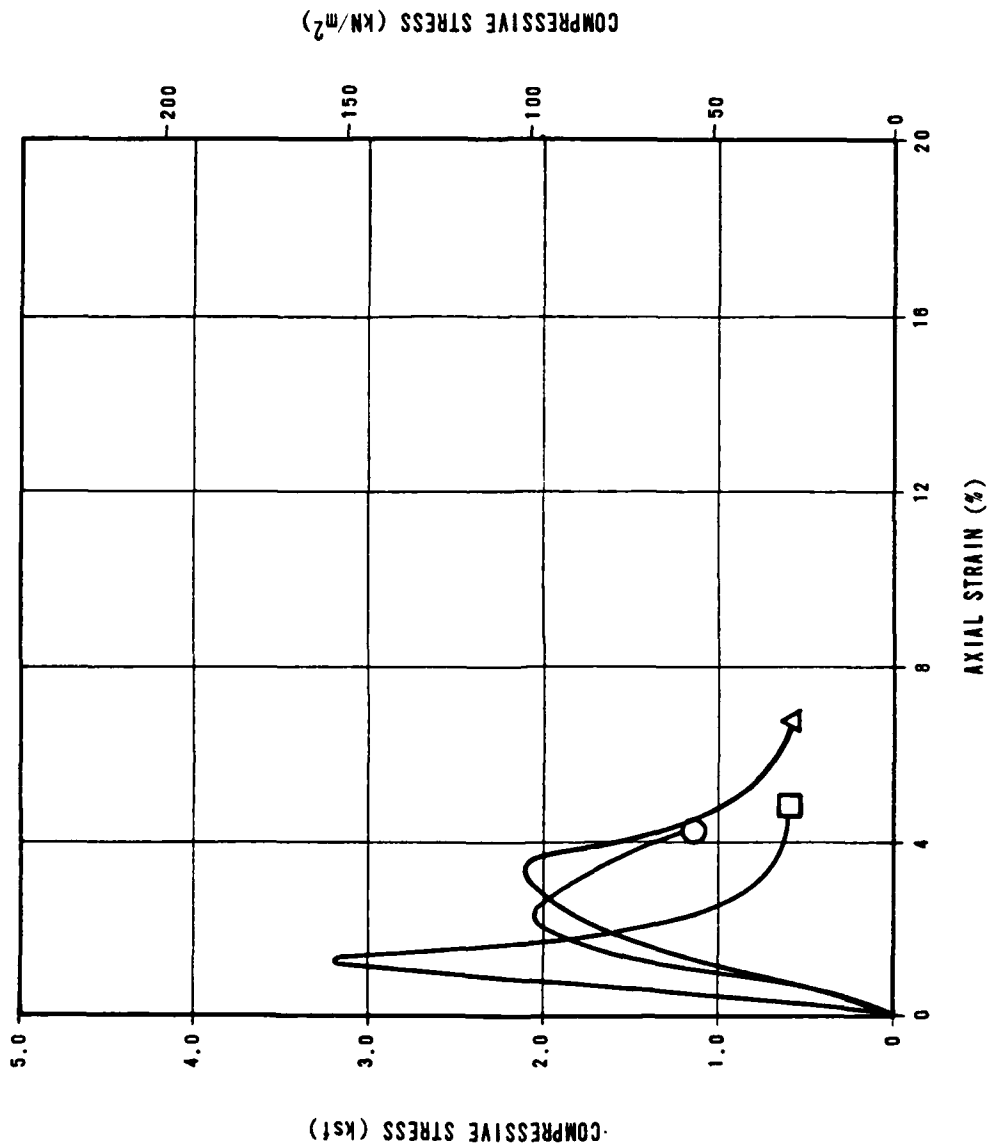
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH ksf	UNCONFINED COMP. STRENGTH kN/m ²	DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT OF DIAMETER
			FEET	METERS				pcf	kg/m ³			
○	LD-0-3	P-18	250.0-250.6	76.25-76.43	SM	2.2	105	129.2	2070	6.3	87.3	2.4
△	LD-8-17	P-7	50.6-51.1	15.43-15.58	CL	3.1	148	100.5	1610	16.0	79.7	2.4
□	LD-0-2	P-12	125.0-125.6	38.12-38.31	SM	5.0	240	112.1	1796	13.6	68.8	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-94

FUGRO NATIONAL, INC.



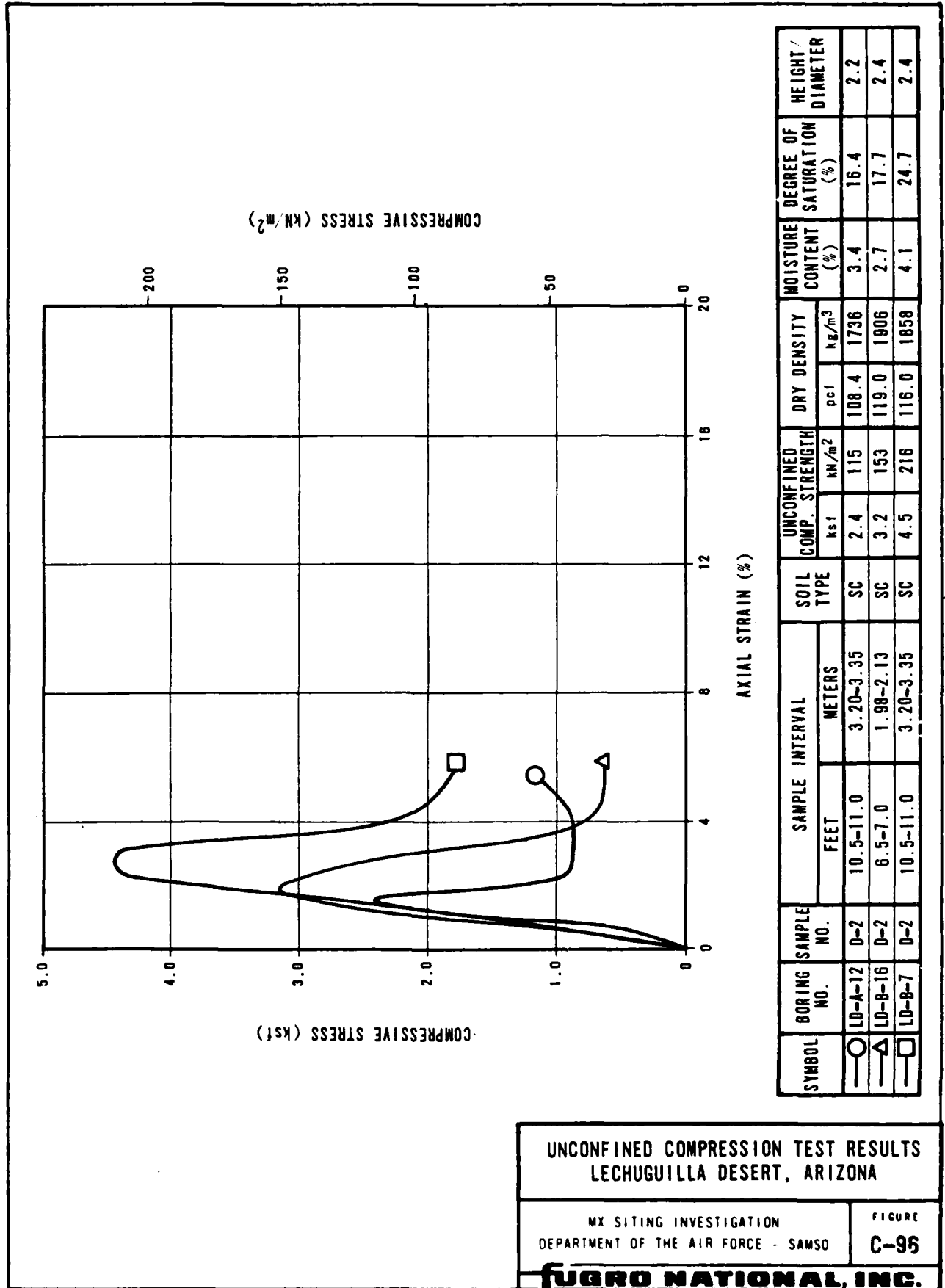
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT / DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-C-5	P-1	6.2-6.8	1.89-2.07	SC	2.1	101	118.1	1892	8.7	51.0	2.4
△	LD-C-4	P-11	90.0-90.6	27.45-27.63	SC	2.1	101	115.7	1853	10.7	75.0	2.8
□	LD-B-9	D-3	15.5-16.0	4.73-4.88	SM/SC	3.2	153	116.8	1871	3.2	19.3	2.4

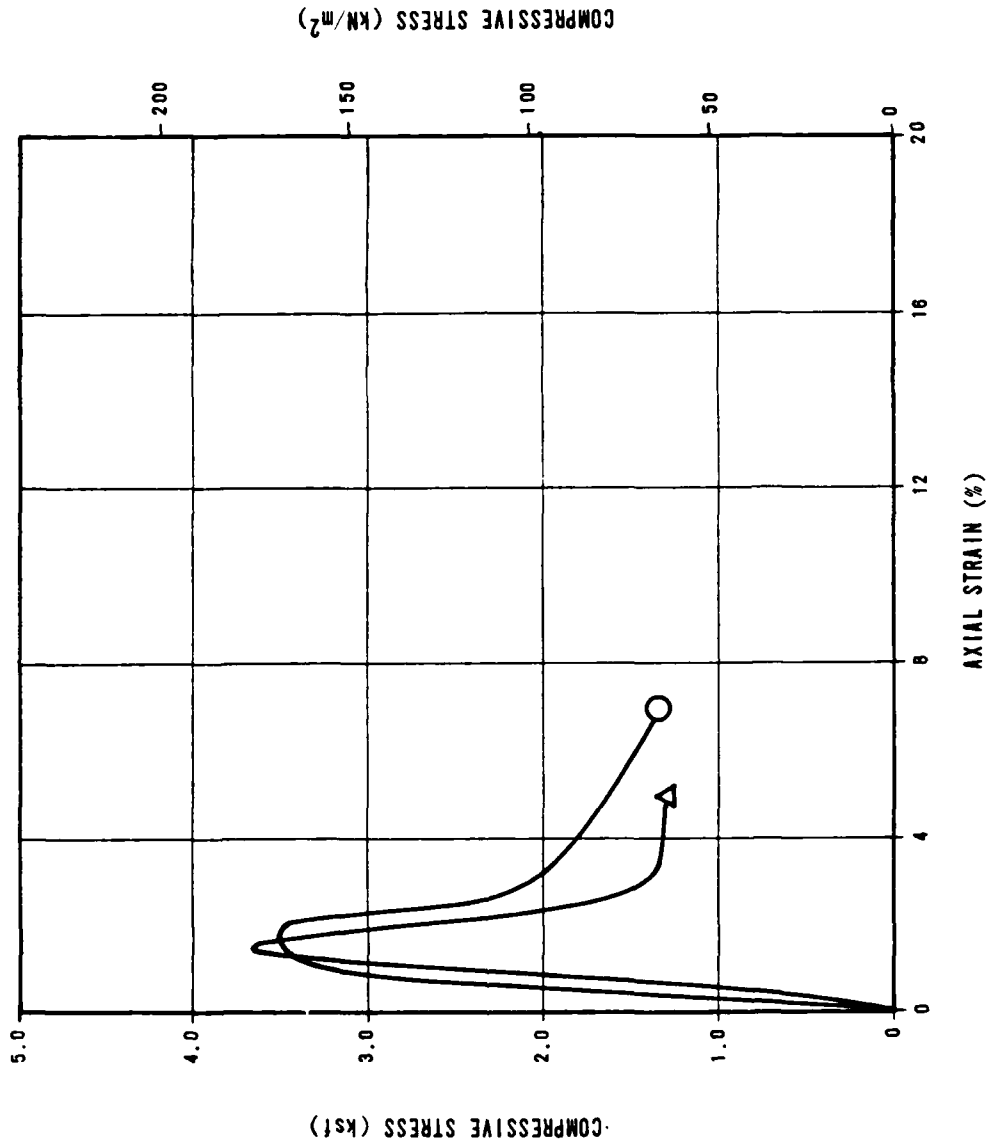
UNCONFINED COMPRESSION TEST RESULTS
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-95

FUGRO NATIONAL, INC.





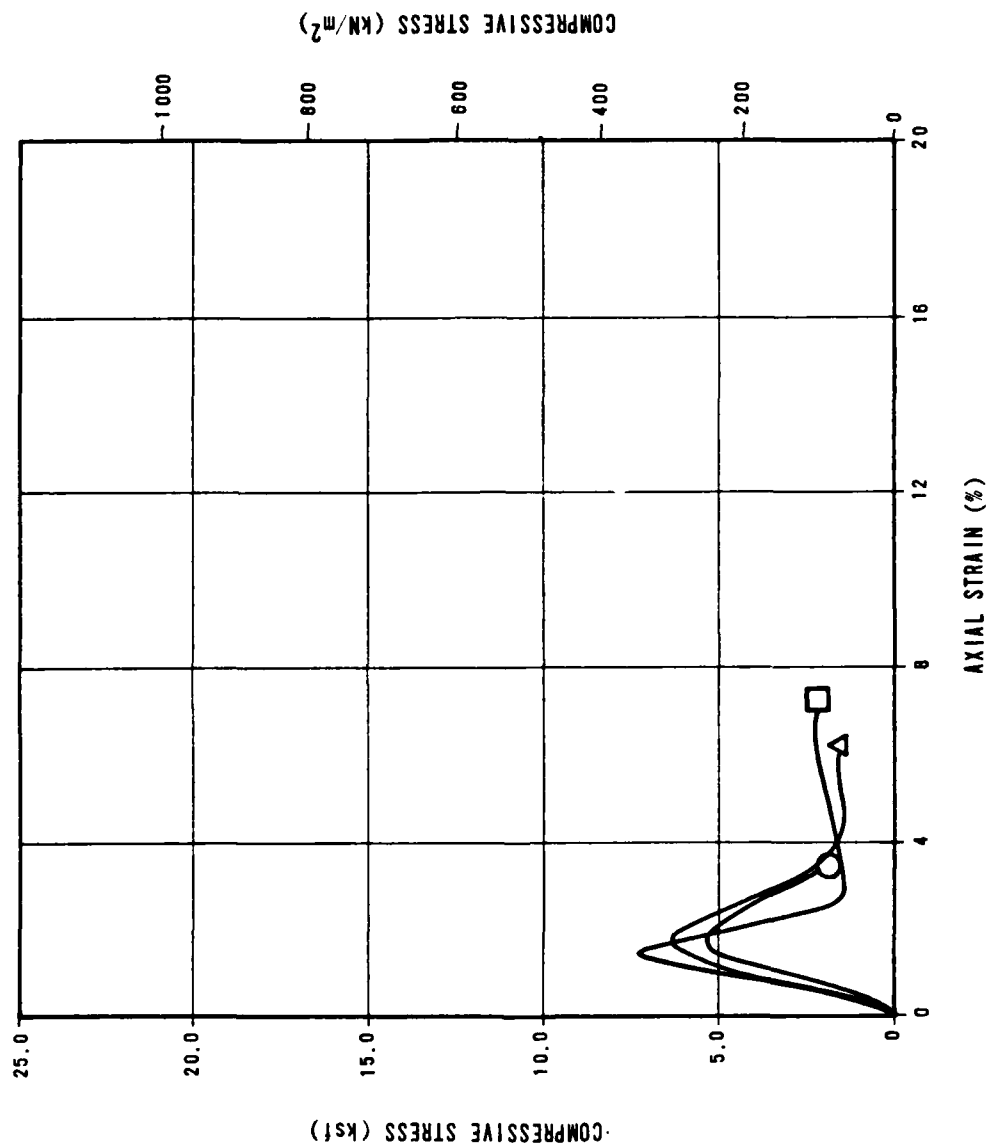
SYMBOL	BORING SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT / DIAMETER
		FEET	METERS		ksf	KN/m^2	pcf	kg/m^3			
○	LD-A-1	16.5-17.1	5.01-5.21	CH	3.5	168	109.2	1749	13.3	66.1	2.4
△	LD-D-1	20.0-20.6	6.10-6.28	SC	3.6	172	110.6	1772	4.7	31.8	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-97

FUGRO NATIONAL, INC.



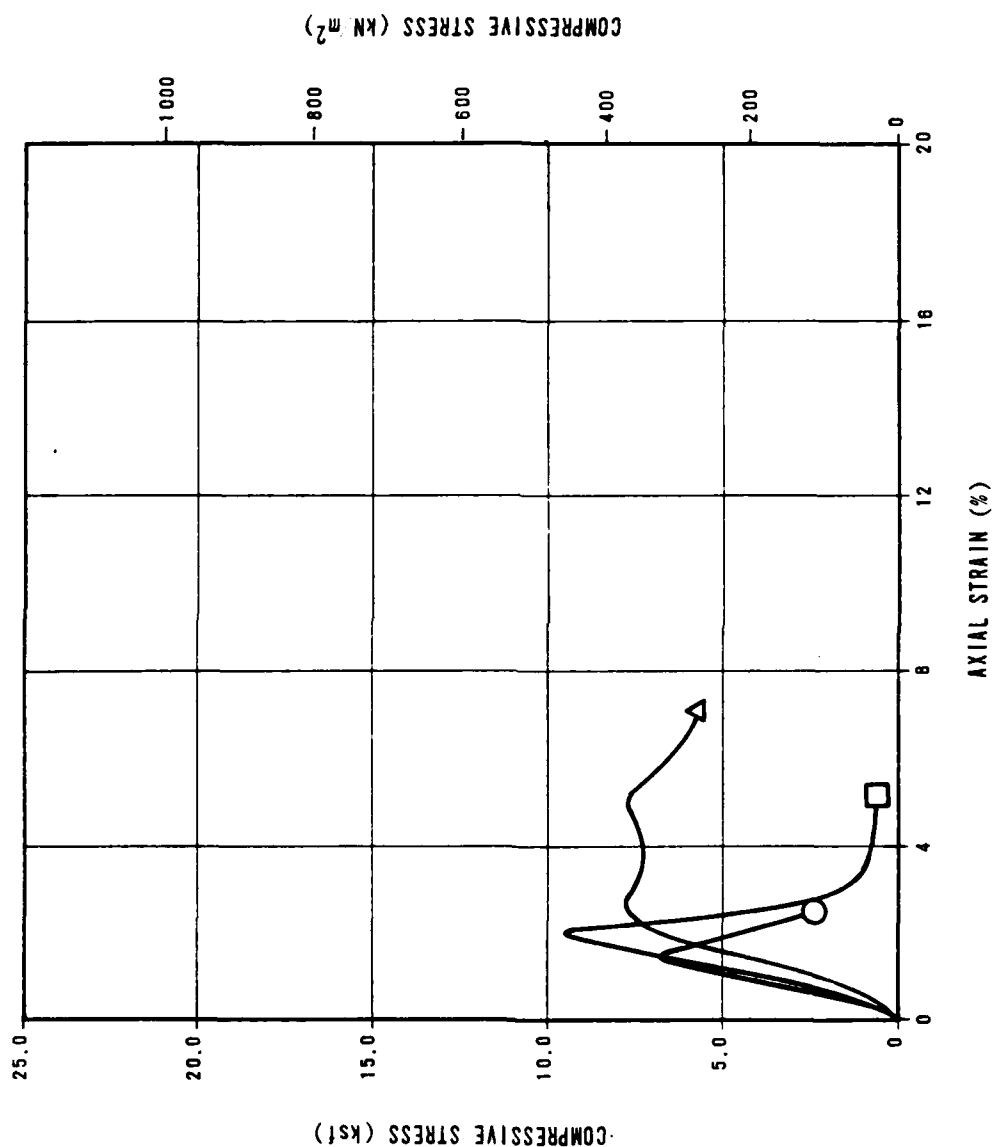
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-D-3	P-1	5.9-6.5	1.80-1.98	SC	5.4	259	122.4	1961	6.2	56.2	2.4
△	LD-A-10	D-1	5.5-6.0	1.68-1.83	SC	6.5	311	112.4	1800	5.7	30.9	2.4
□	LD-A-4	D-2	5.8-6.3	1.77-1.92	SC/SM	7.3	350	112.4	1800	5.4	29.0	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-98

FUGRO NATIONAL, INC.



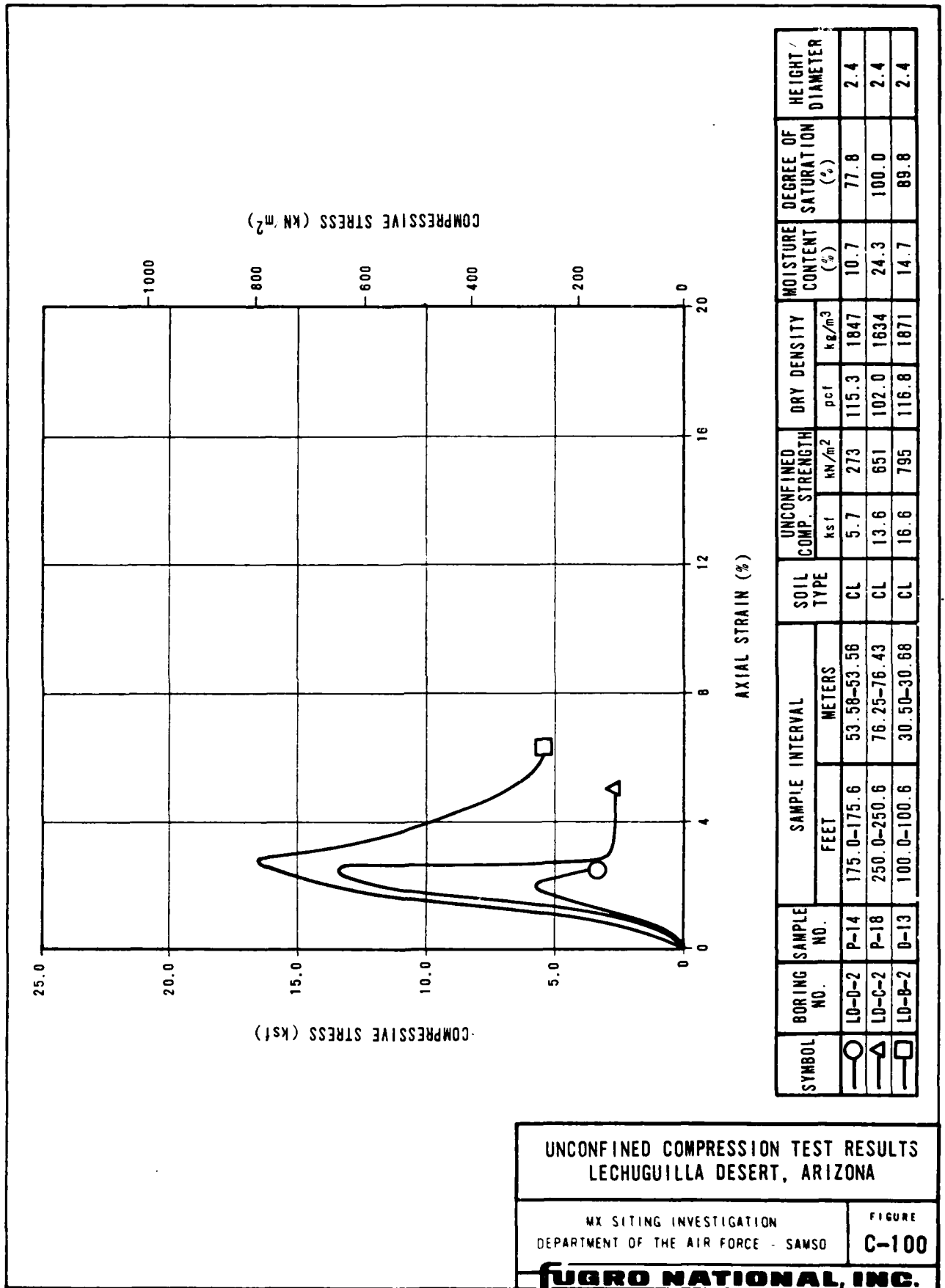
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT DIAMETER
			FEET	METERS		ksf	kN/m ²	pct	kg/m ³			
○	LD-0-3	P-4	21.5-22.1	6.56-6.74	SC	6.8	326	119.9	1921	5.4	37.0	2.4
△	LD-4-8	D-2	10.5-11.0	3.20-3.35	SC	7.8	374	104.2	1669	8.2	36.8	2.4
□	LD-0-1	P-1	5.6-6.2	1.71-1.89	SC	9.5	455	119.0	1906	5.5	35.0	2.4

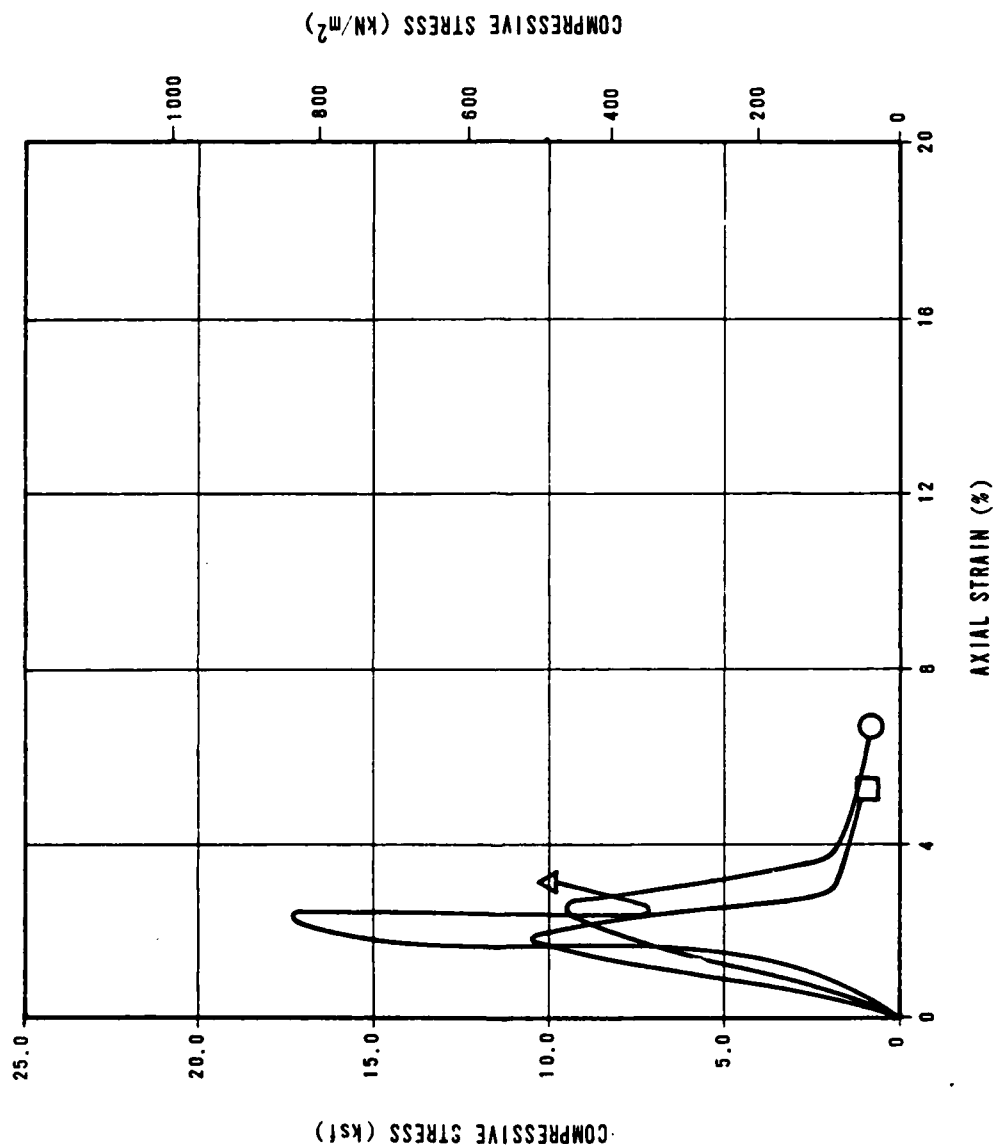
UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-99

FUGRO NATIONAL, INC.





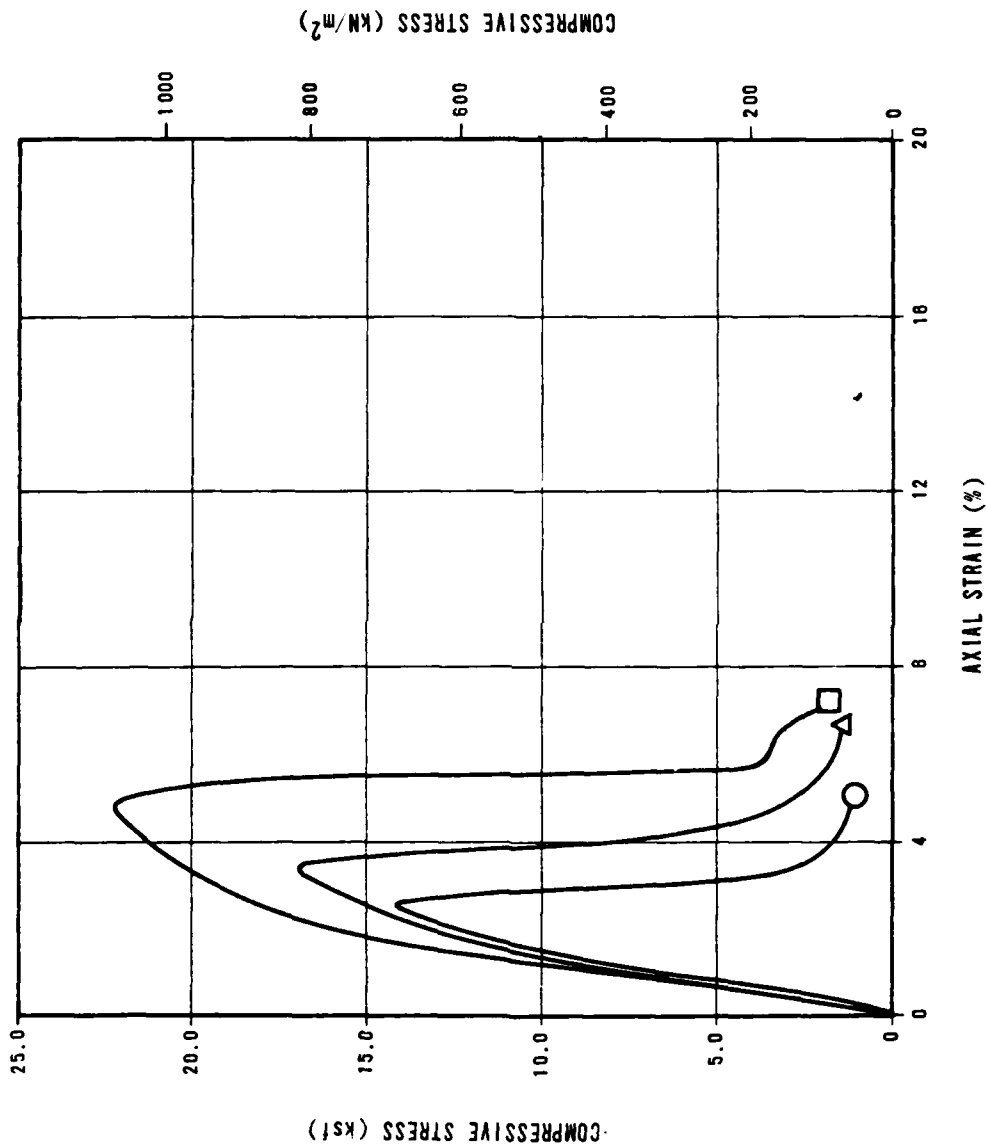
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT/DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-C-2	P-7	50.0-50.6	15.25-15.43	CH	9.5	455	104.5	1674	20.8	78.9	2.4
△	LD-C-3	P-20	300.0-300.6	91.50-91.68	CH	17.4	833	112.7	1805	17.2	107.2	2.4
□	LD-B-14	D-9	60.5-61.0	18.45-18.60	CH	10.6	508	97.1	1555	26.2	96.1	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-101

FUGRO NATIONAL, INC.



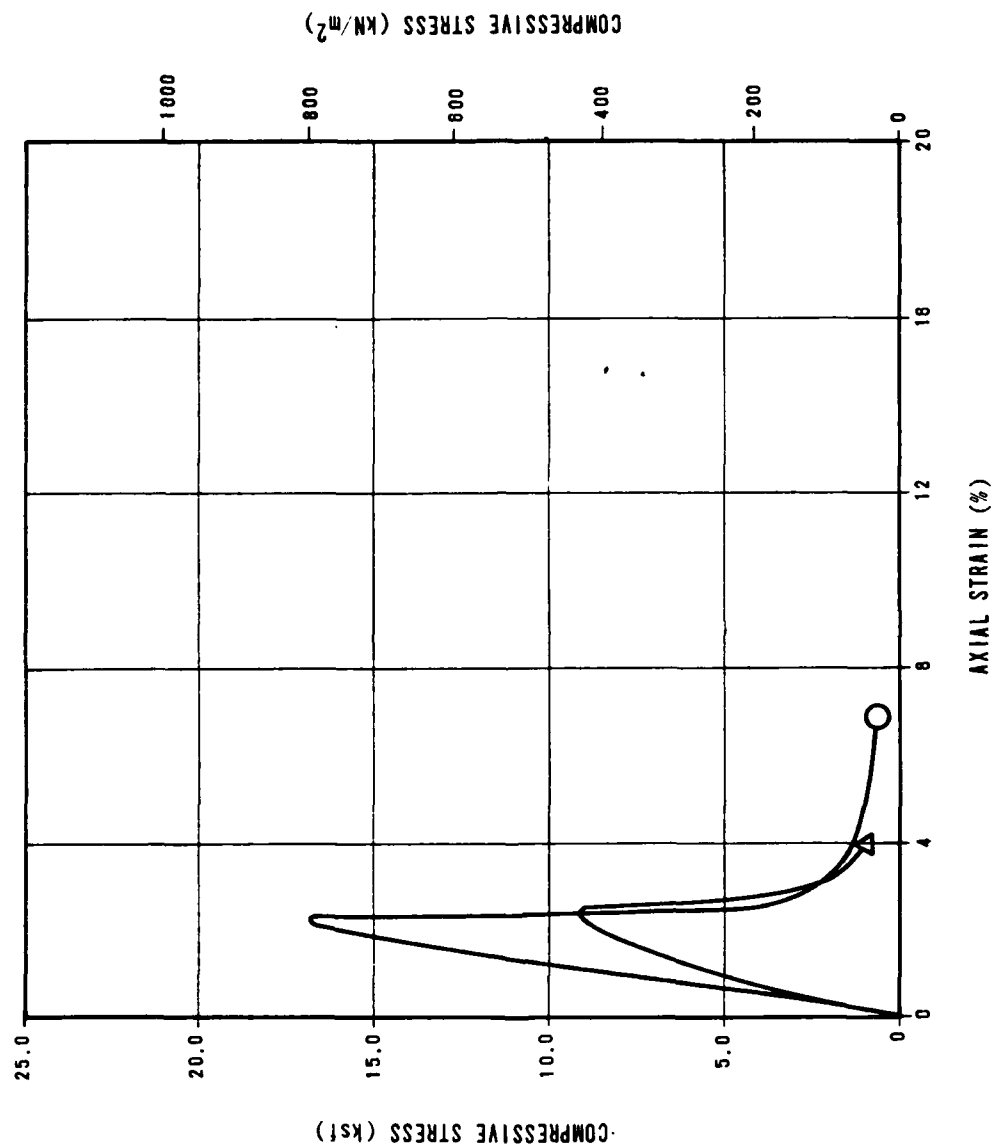
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT OF DIAMETER
			FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-B-17	P-5	30.5-31.2	9.30-9.51	CH	14.1	675	111.0	1778	17.5	91.0	2.4
△	LD-B-16	D-15	90.0-90.5	27.45-27.60	CH	16.9	810	99.9	1600	24.3	95.6	2.4
□	LD-B-16	D-11	50.5-51.0	15.40-15.56	CH	22.3	1068	105.8	1695	21.2	96.6	2.4

UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-102

FUGRO NATIONAL, INC.



SYMBOL	BORING SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	UNCONFINED COMP. STRENGTH		DRY DENSITY		MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	HEIGHT DIAMETER
		FEET	METERS		ksf	kN/m ²	pcf	kg/m ³			
○	LD-C-6 P-9	80.0-80.6	24.40-24.58	CH	9.2	441	103.8	1663	22.7	101.9	2.4
△	LD-C-2 P-15	175.0-175.6	53.38-53.56	CH	16.8	805	111.5	1786	12.6	100.0	2.4

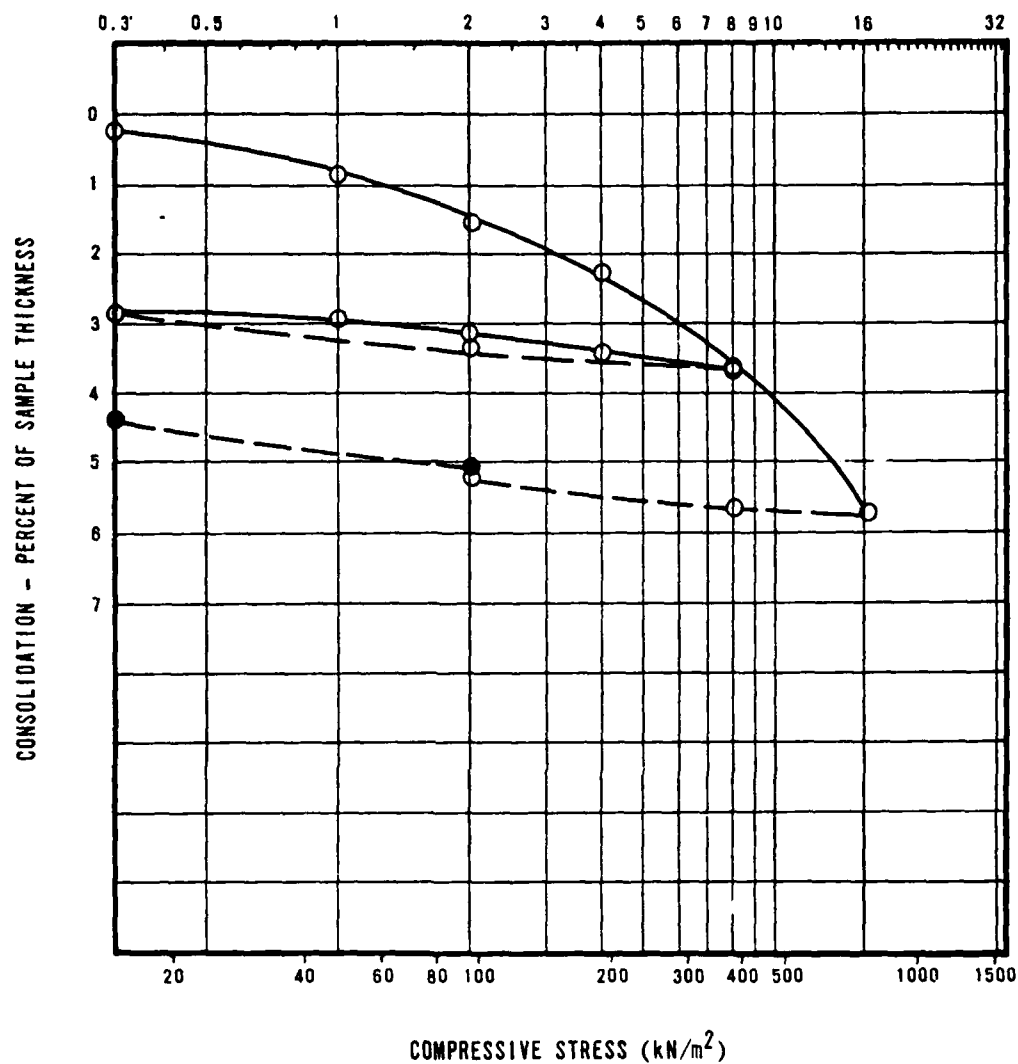
UNCONFINED COMPRESSION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-103

FUGRO NATIONAL, INC.

COMPRESSIVE STRESS (ksf)

[illegible]

○ AT FIELD MOISTURE
● AFTER ADDITION OF WATER
— COMPRESSION
- - - REBOUND

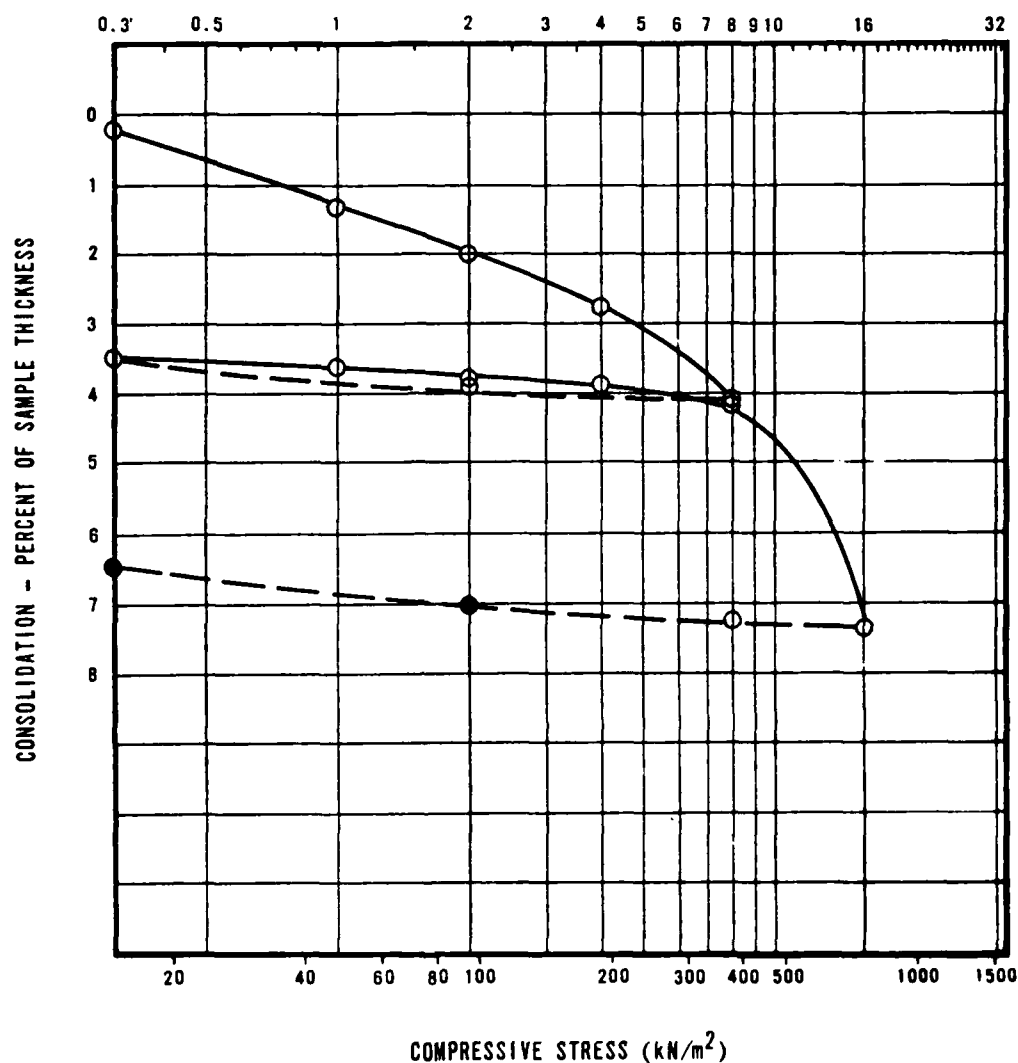
CONSOLIDATION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-104

FUGRO NATIONAL, INC.

COMPRESSIVE STRESS (ksf)

[illegible]

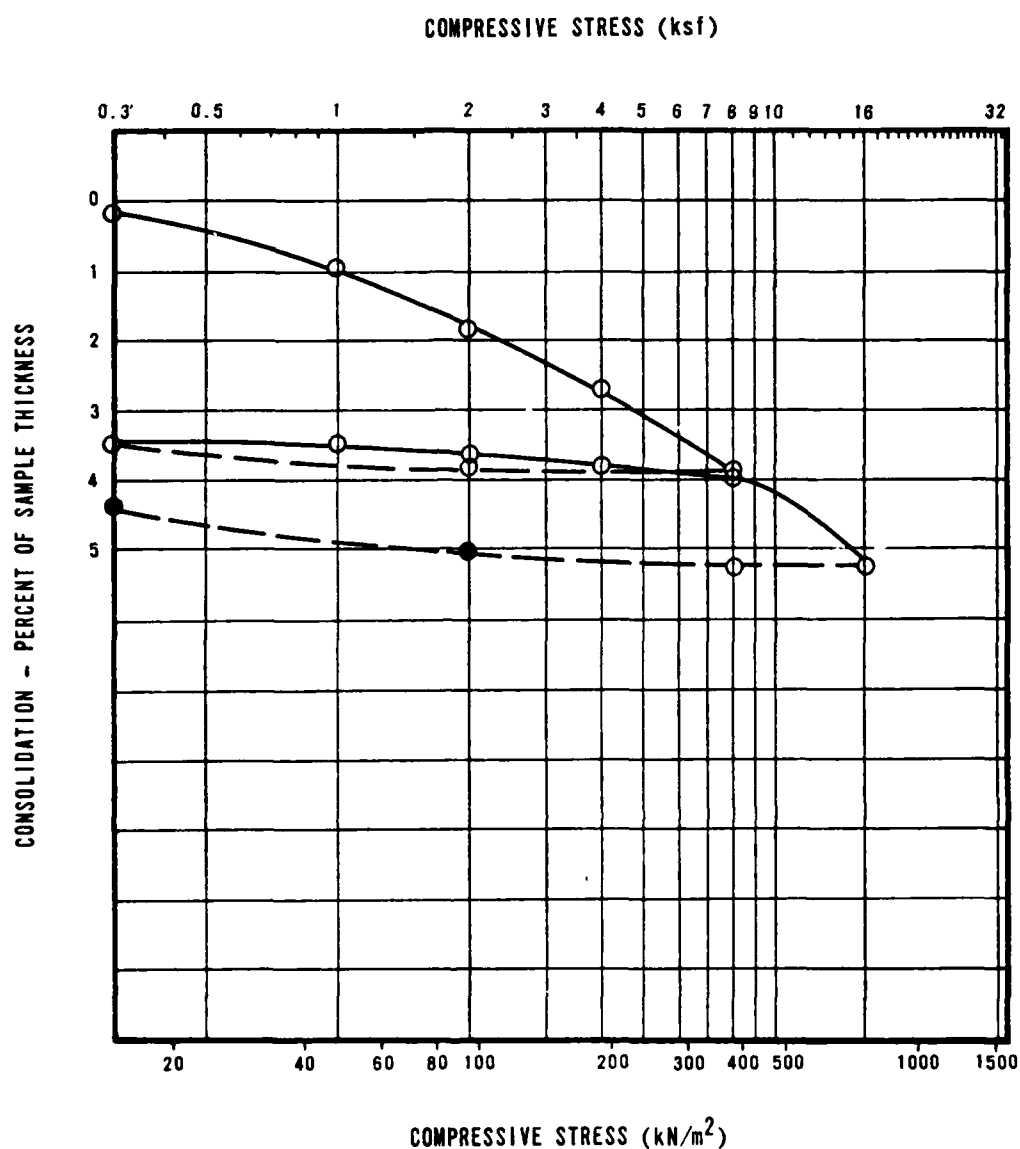
○ AT FIELD MOISTURE
● AFTER ADDITION OF WATER
———— COMPRESSION
- - - - REBOUND

CONSOLIDATION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-105

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	INITIAL DRY DENSITY		INITIAL MOISTURE CONTENT (%)	INITIAL VOID RATIO	INITIAL DEGREE OF SATURATION (%)
			FEET	METERS		pcf	kg/m ³			
○	LD-B-1	P-4	21.2-21.8	6.46-6.64	SM	115.2	1845	9.1	0.46	53.1

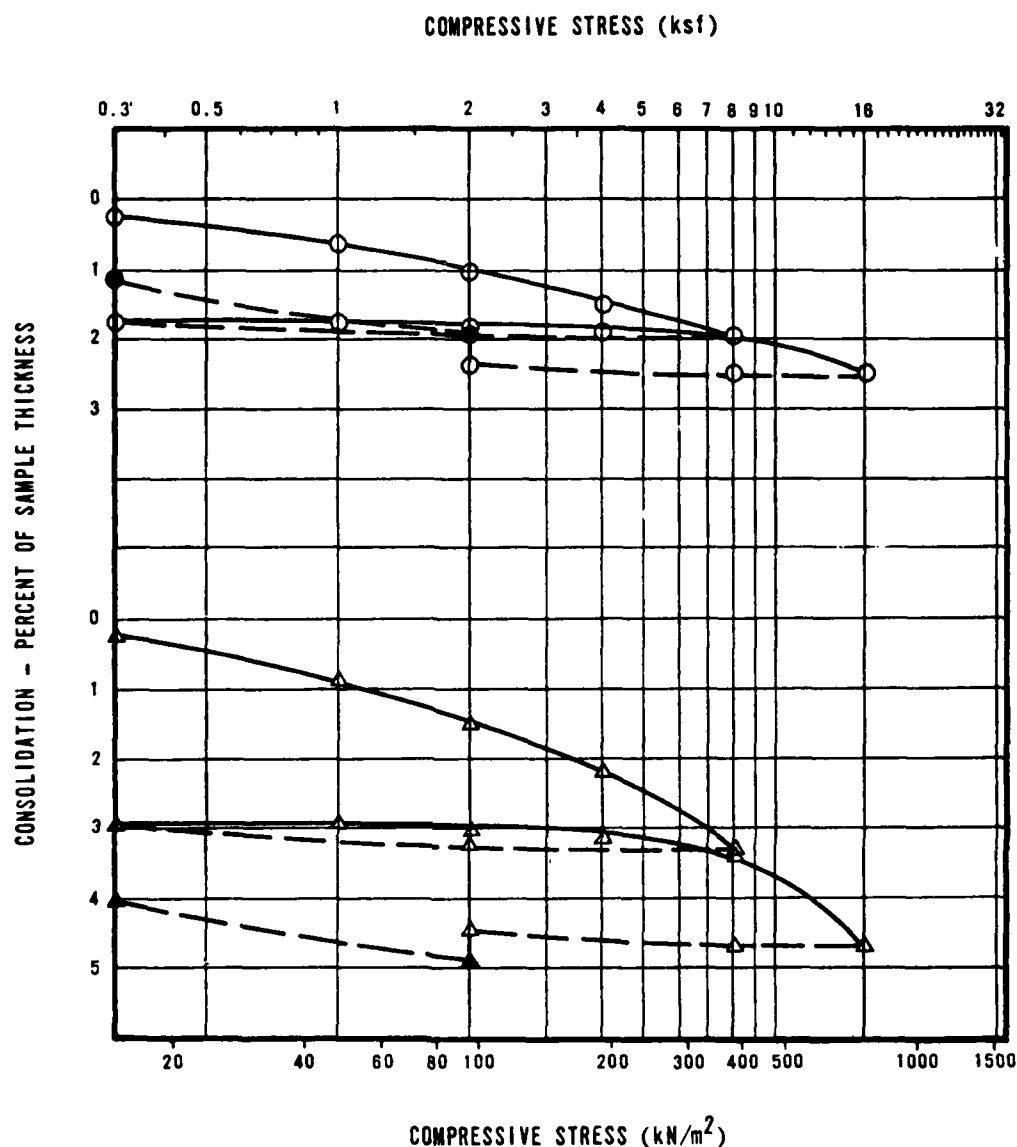
- AT FIELD MOISTURE
 ● AFTER ADDITION OF WATER
 — COMPRESSION
 - - - REBOUND

**CONSOLIDATION TEST RESULTS
LECHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-106

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	INITIAL DRY DENSITY		INITIAL MOISTURE CONTENT (%)	INITIAL VOID RATIO	INITIAL DEGREE OF SATURATION (%)
			FEET	METERS		pcf	kg/m ³			
○	LD-A-10	D-5	20.5-21.0	6.25-6.40	SM	119.5	1914	2.8	0.41	18.4
▲	LD-B-11	D-6	30.5-31.0	9.30-9.45	SM/ML	104.5	1674	4.3	0.61	19.1

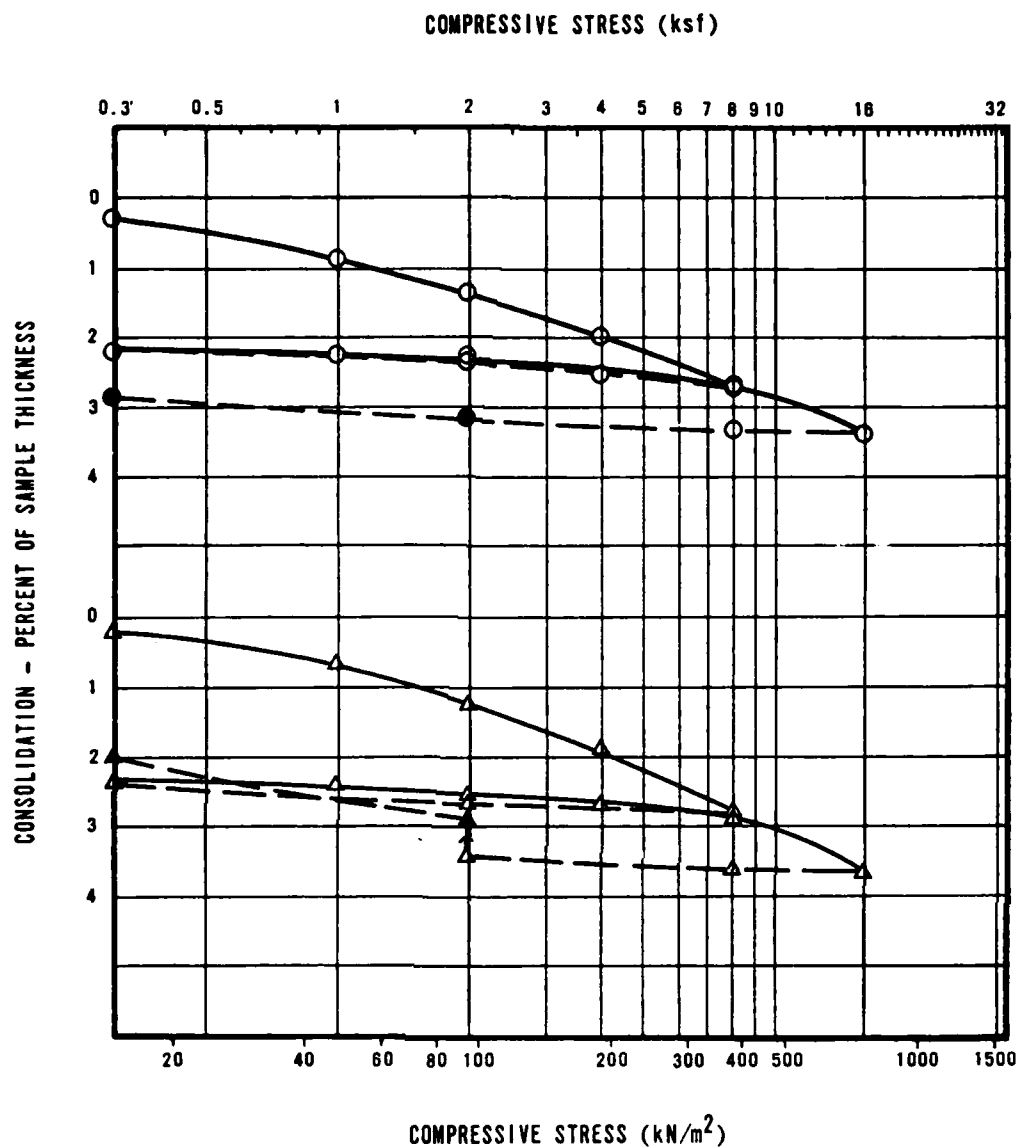
- AT FIELD MOISTURE
● AFTER ADDITION OF WATER
— COMPRESSION
--- REBOUND

**CONSOLIDATION TEST RESULTS
LECHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-107

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	INITIAL DRY DENSITY		INITIAL MOISTURE CONTENT (%)	INITIAL VOID RATIO	INITIAL DEGREE OF SATURATION (%)
			FEET	METERS		pcf	kg/m ³			
○	LD-B-17	P-4	21.2-21.4	6.46-6.54	SW/SM	111.9	1792	10.9	0.51	58.2
△	LD-D-3	P-4	20.0-20.6	6.10-6.28	SC	120.3	1927	7.1	0.40	47.9

- AT FIELD MOISTURE
 ● AFTER ADDITION OF WATER
 — COMPRESSION
 --- REBOUND

**CONSOLIDATION TEST RESULTS
LECHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE

C-108

FUGRO NATIONAL, INC.

[illegible]

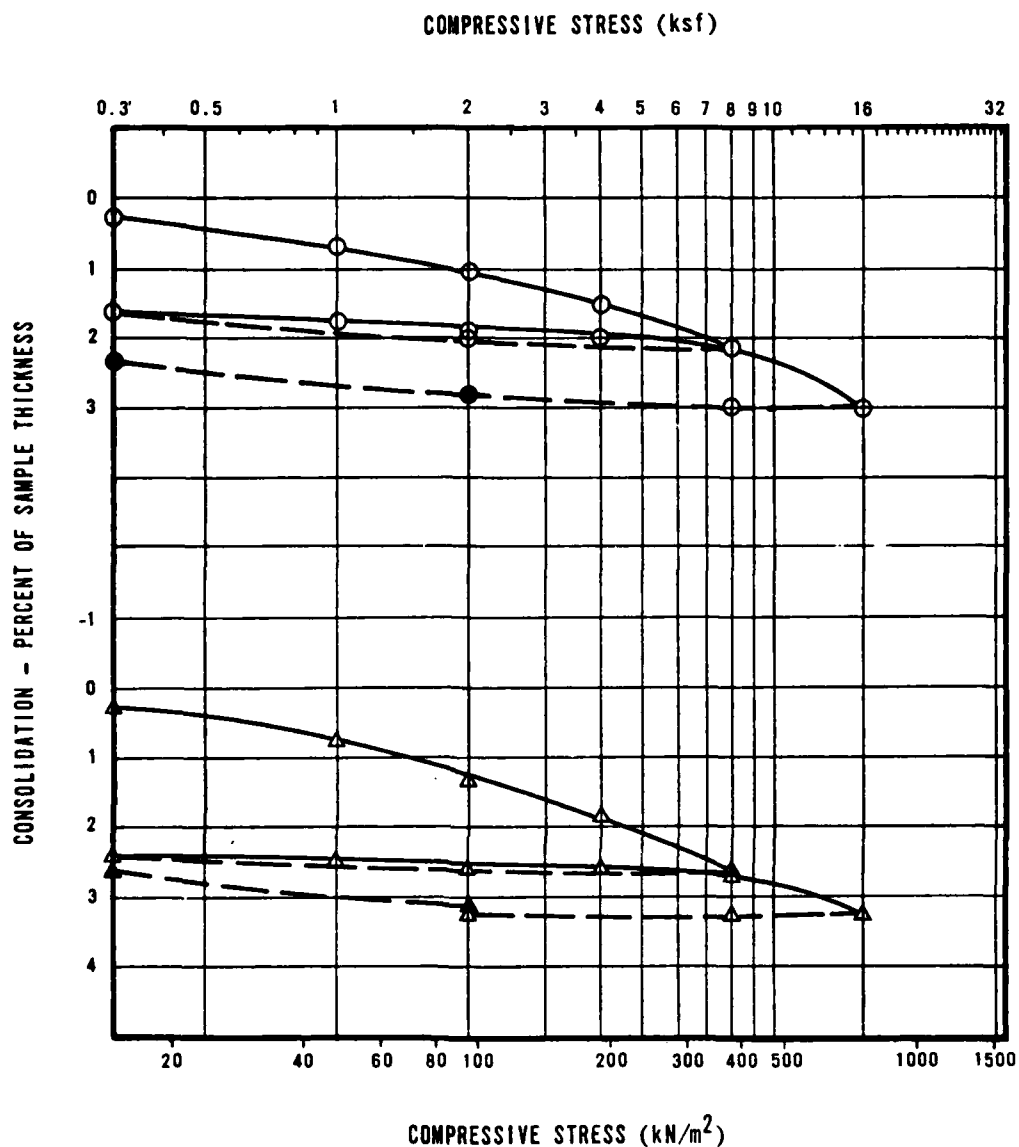
○ AT FIELD MOISTURE
● AFTER ADDITION OF WATER
— COMPRESSION
- - - REBOUND

CONSOLIDATION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-109

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	INITIAL DRY DENSITY		INITIAL MOISTURE CONTENT (%)	INITIAL VOID RATIO	INITIAL DEGREE OF SATURATION (%)
			FEET	METERS		pcf	kg/m ³			
○	LD-C-2	P-4	20.6-21.0	6.28-6.40	SC	111.1	1780	11.8	0.52	61.7
△	LD-C-4	P-5	30.6-31.2	9.33-9.51	SC	116.8	1871	9.1	0.44	55.5

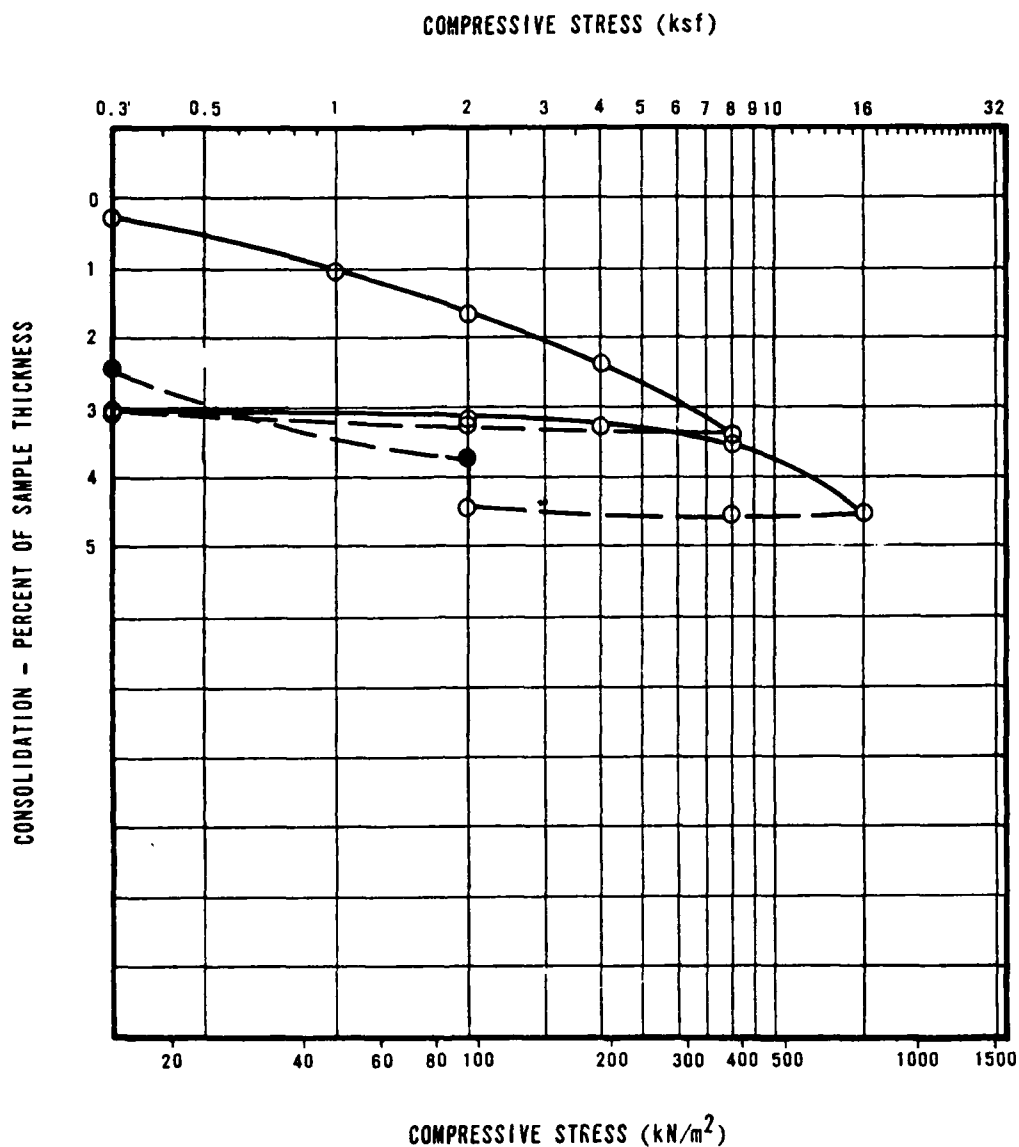
- AT FIELD MOISTURE
 ● AFTER ADDITION OF WATER
 — COMPRESSION
 --- REBOUND

CONSOLIDATION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-110

FUGRO NATIONAL, INC.

[illegible]

○ AT FIELD MOISTURE
● AFTER ADDITION OF WATER
— COMPRESSION
- - - REBOUND

● AFTER ADDITION OF WATER

COMPRESSION

REBOUND

CONSOLIDATION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-111

FUGRO NATIONAL, INC.

[illegible]

○ AT FIELD MOISTURE
● AFTER ADDITION OF WATER
— COMPRESSION
- - - REBOUND

CONSOLIDATION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-112

FUGRO NATIONAL, INC.

[illegible]

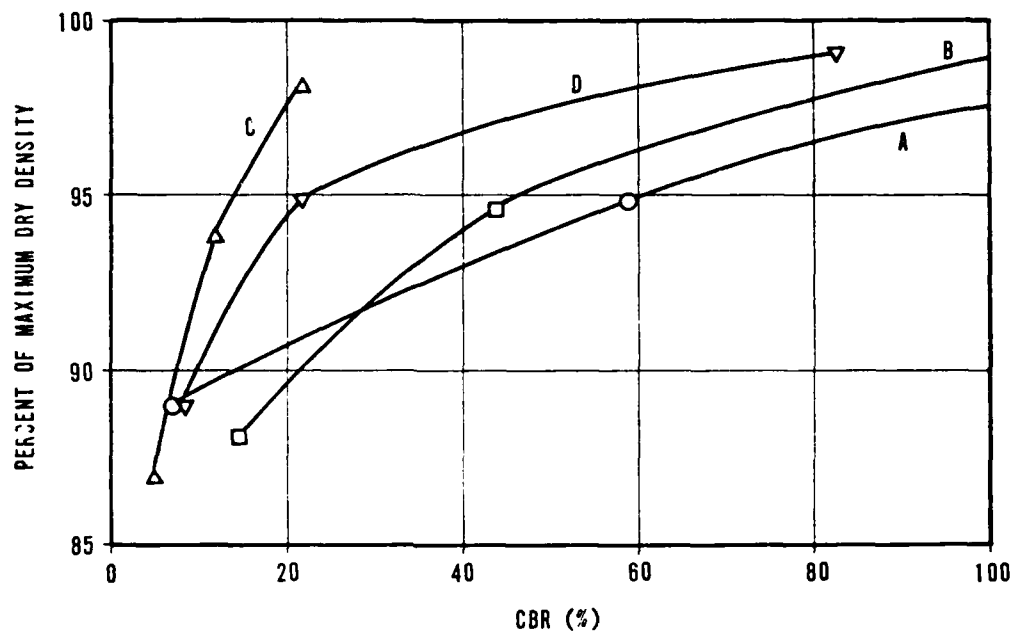
○ AT FIELD MOISTURE
● AFTER ADDITION OF WATER
— COMPRESSION
- - - REBOUND

CONSOLIDATION TEST RESULTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-113

FUGRO NATIONAL, INC.



SYMBOL	COMPOSITE SAMPLE NO.	SOIL TYPE
○	A	SM
□	B	SC/SM
△	C	SC
▽	D	SC

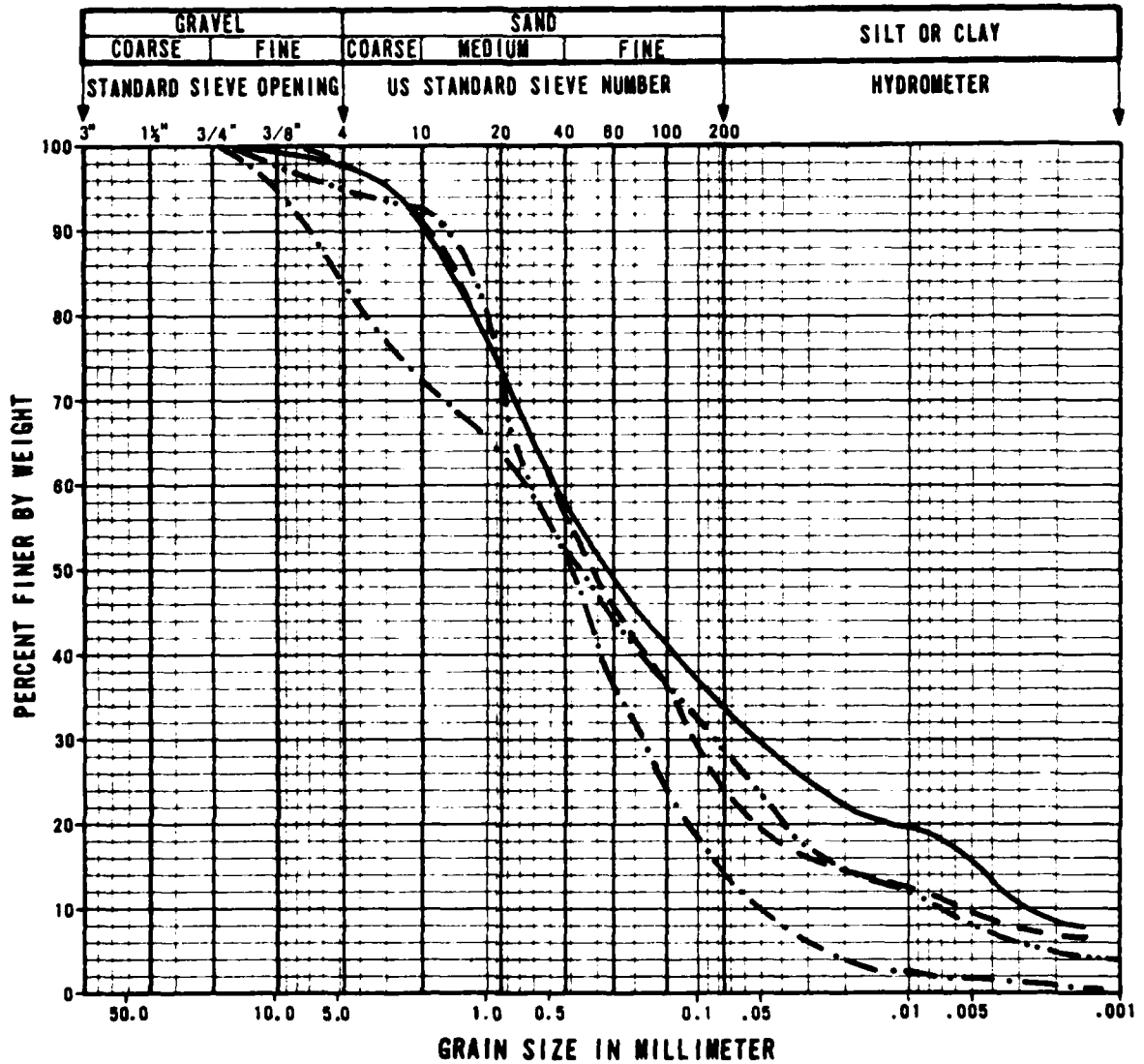
NOTE: A tabulation of CBR test results and a sieve analysis plot for each composite sample are presented in table C-6 and figure C-115, respectively.

CALIFORNIA BEARING RATIO
(CBR) CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-114

FUGRO NATIONAL, INC.



SYMBOL	COMPOSITE SAMPLE NUMBER	BORING NO.	SAMPLE INTERVAL		SOIL TYPE
			FEET	METERS	
—	A	LD-T-1*	2.0-3.0	0.61-0.91	SM
—	A	LD-B-5	0.0-0.5	0.00-0.15	
—	A	LD-B-15	0.0-2.5	0.00-0.78	
- - -	B	LD-T-10*	7.0-9.0	2.13-2.74	SC/SM
- - -	B	LD-T-12*	6.0-8.0	1.83-2.44	
- - -	B	LD-T-17*	8.0-11.0	2.44-3.35	
- . - .	C	LD-T-5*	0.5-1.5	0.15-0.46	SC
- . - .	C	LD-A-10	5.0-10.0	1.52-3.05	
- . - .	C	LD-B-18	1.0-3.0	0.30-0.91	
· · · ·	D	LD-T-20*	3.0-6.0	0.91-1.83	SC
· · · ·	D	LD-A-1	0.5-1.0	0.15-0.30	

*TRENCH

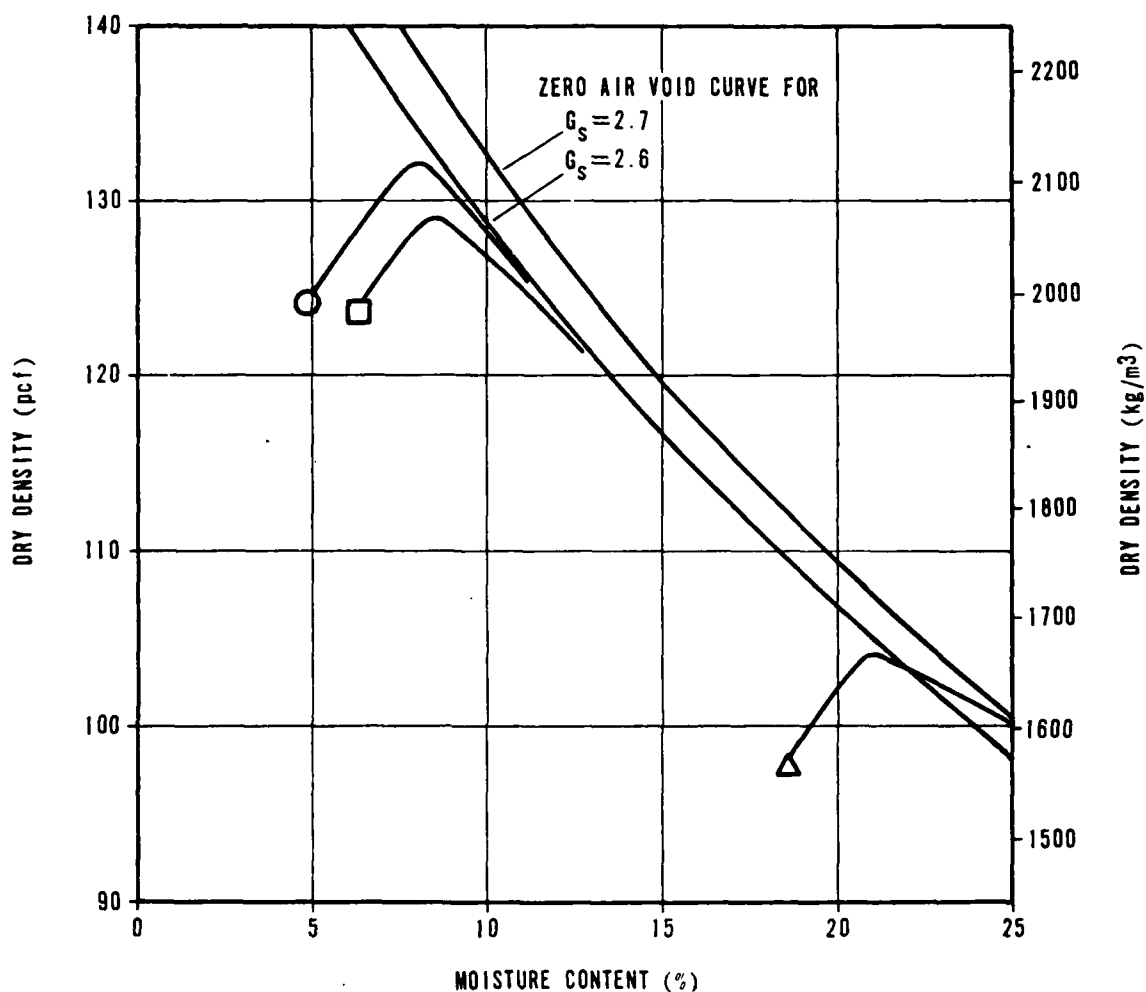
GRAIN SIZE CURVES, CBR TESTS LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE

C-115

FUGRO NATIONAL INC.



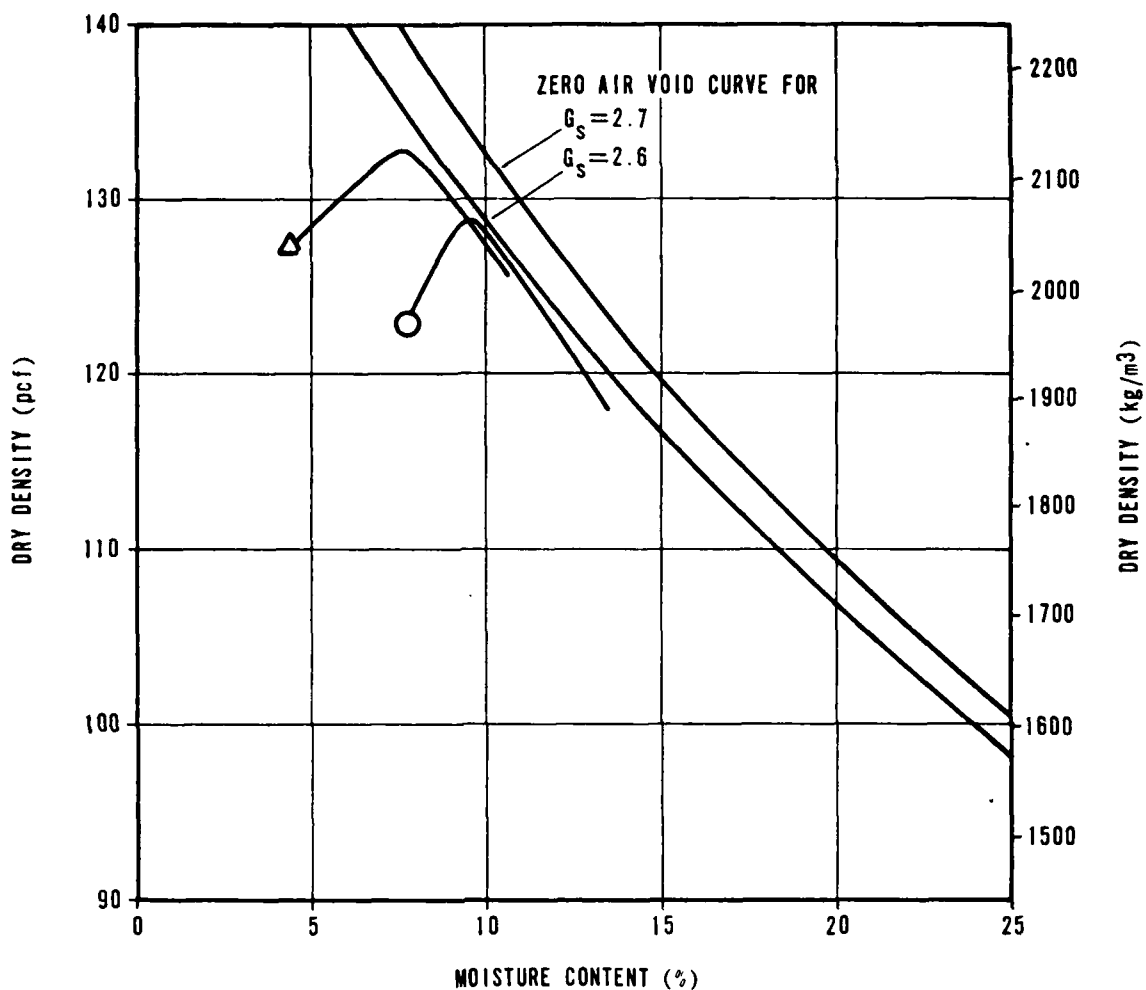
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)
			FEET	METERS		pcf	kg/m³	
○	LD-A-6	8-3	10.0-15.0	3.05-4.57	SC	132.0	2114	8.2
△	LD-T-1	8-4	12.0-13.0	3.66-3.96	MH	104.0	1666	21.0
□	LD-T-4	8-2	3.0-5.0	0.91-1.52	CL	128.9	2065	8.6

**COMPACTION TEST RESULTS
LECHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-116

FUGRO NATIONAL, INC.



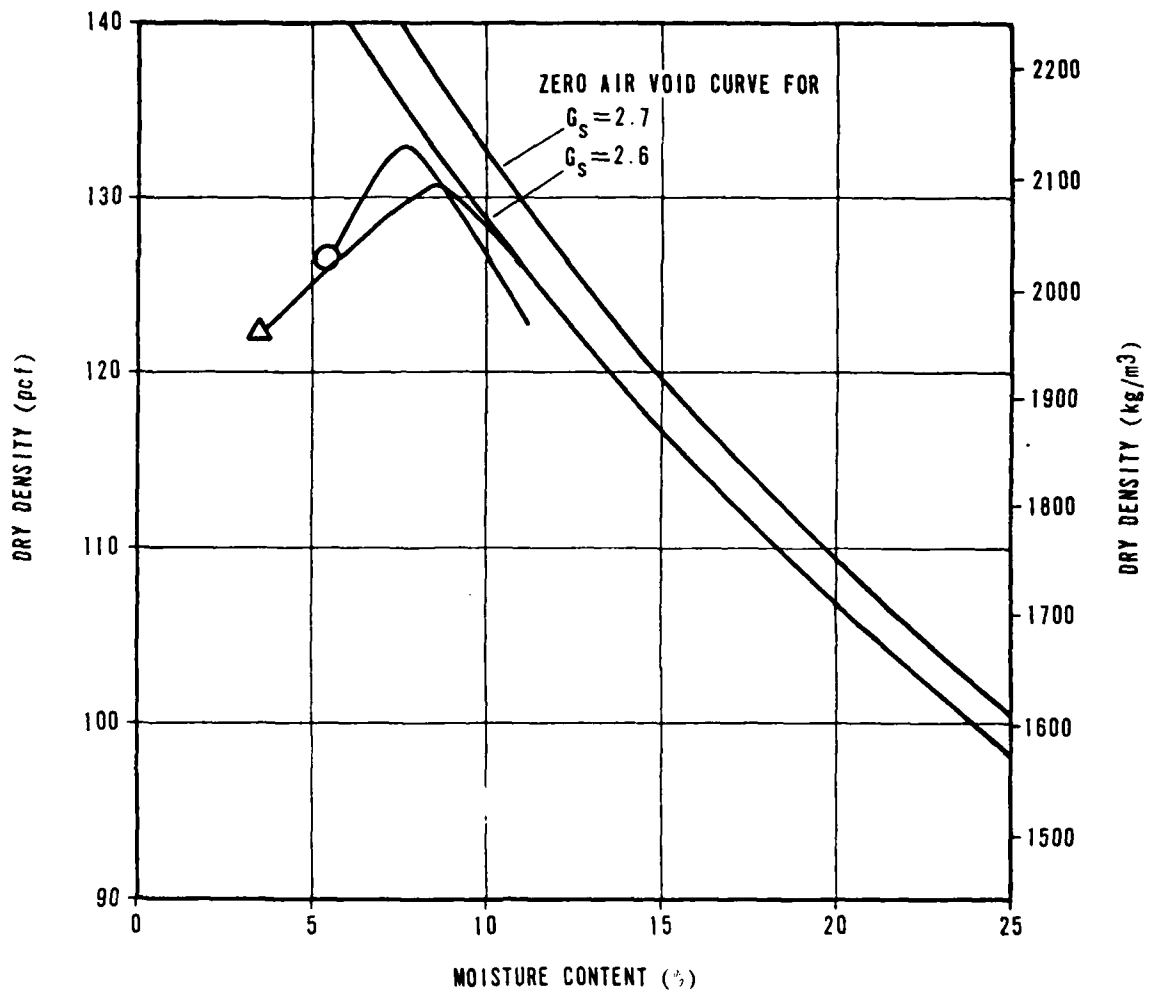
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)
			FEET	METERS		pcf	kg/m ³	
○	LD-B-6	B-4	10.0-15.0	3.05-4.57	SC	128.8	2063	9.6
△	LD-T-9	B-2	8.0-10.0	2.44-3.05	SC	133.0	2130	7.7

**COMPACTION TEST RESULTS
LECTHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-117

FUGRO NATIONAL, INC.



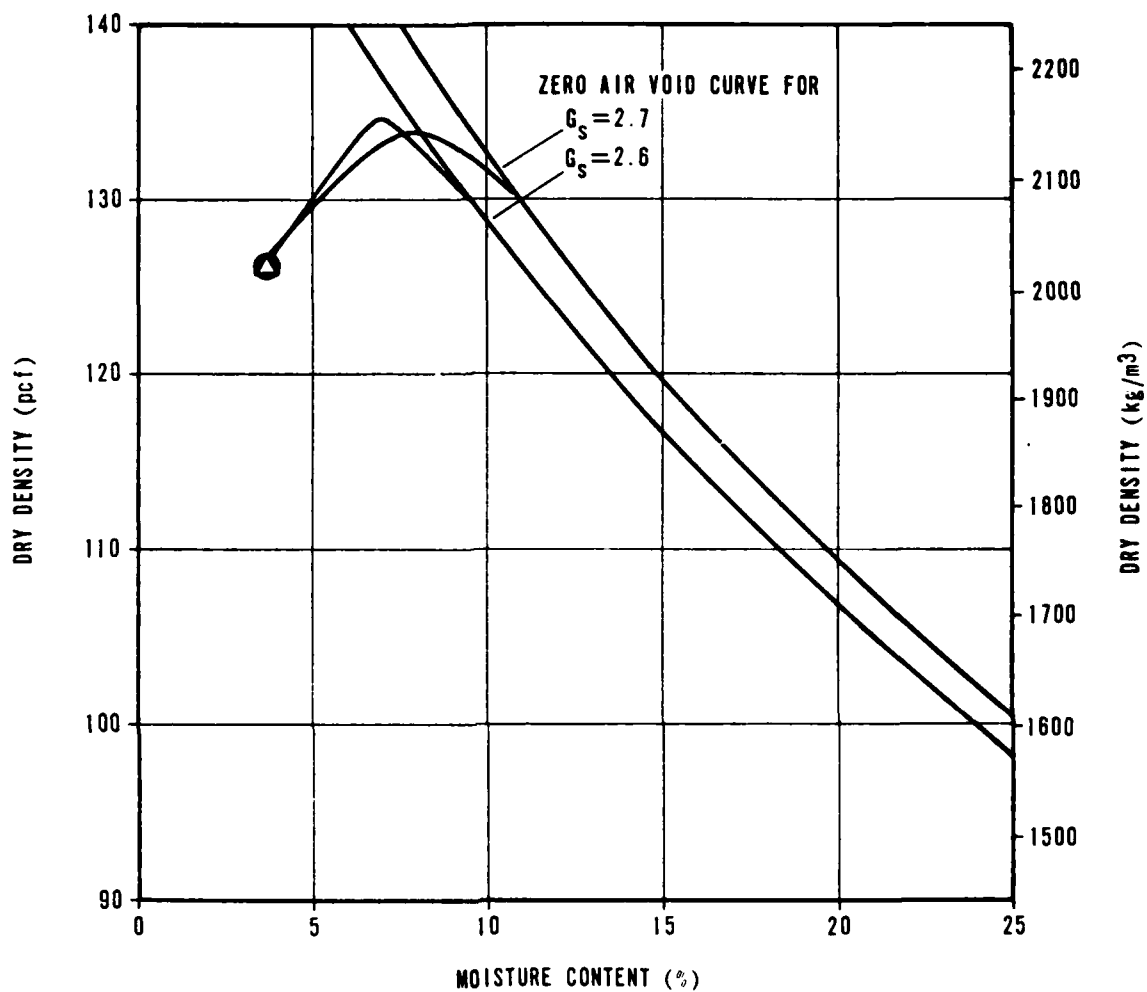
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)
			FEET	METERS		pcf	kg/m ³	
○	LD-T-14	B-3	19.0-21.0	5.79-6.40	SC	133.0	2130	7.7
△	LD-T-15	B-3	12.0-14.0	3.66-4.27	SW/SM	130.5	2090	8.7

**COMPACTION TEST RESULTS
LECTHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-118

FUGRO NATIONAL, INC.



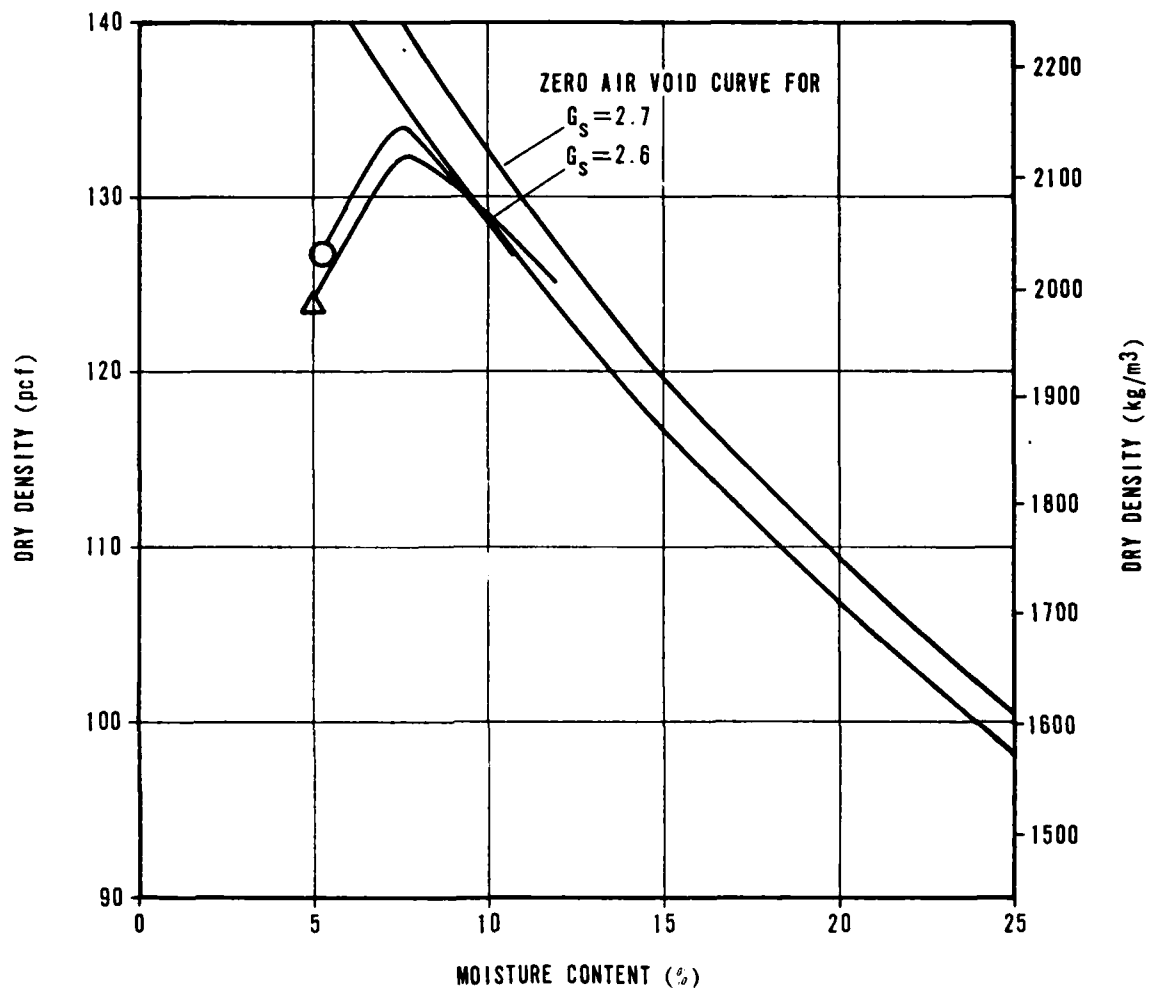
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)
			FEET	METERS		pcf	kg/m ³	
\bigcirc —	LD-T-20	B-3	18.0-21.0	5.49-6.40	SM	134.7	2158	7.0
Δ —	LD-T-21	B-2	4.0-6.0	1.22-1.83	GP/GM	134.0	2146	8.1

COMPACTION TEST RESULTS
LECTHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-119

FUGRO NATIONAL, INC.



SYM	DRILLING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)
			FEET	METERS		pcf	kg/m ³	
○		A*			SM	134.0	2146	7.7
△		C*			SC	132.4	2121	7.8

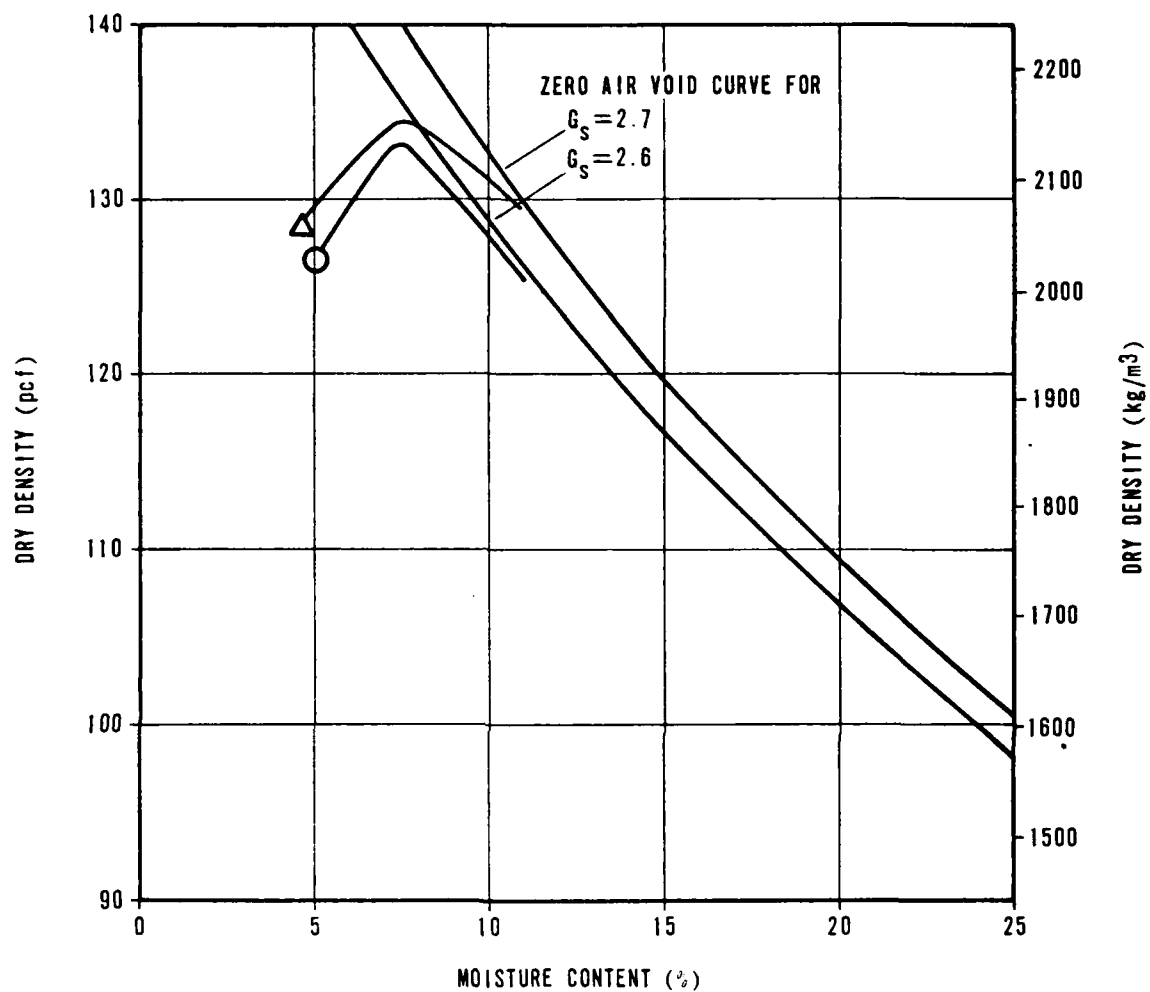
*COMPOSITE SAMPLE

**COMPACTION TEST RESULTS
LEGHUGUILLA DESERT, ARIZONA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-120

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)
			FEET	METERS		pcf	kg/m ³	
○		B*			SC/SM	133.2	2134	7.6
△		D*			SC	134.8	2159	7.8

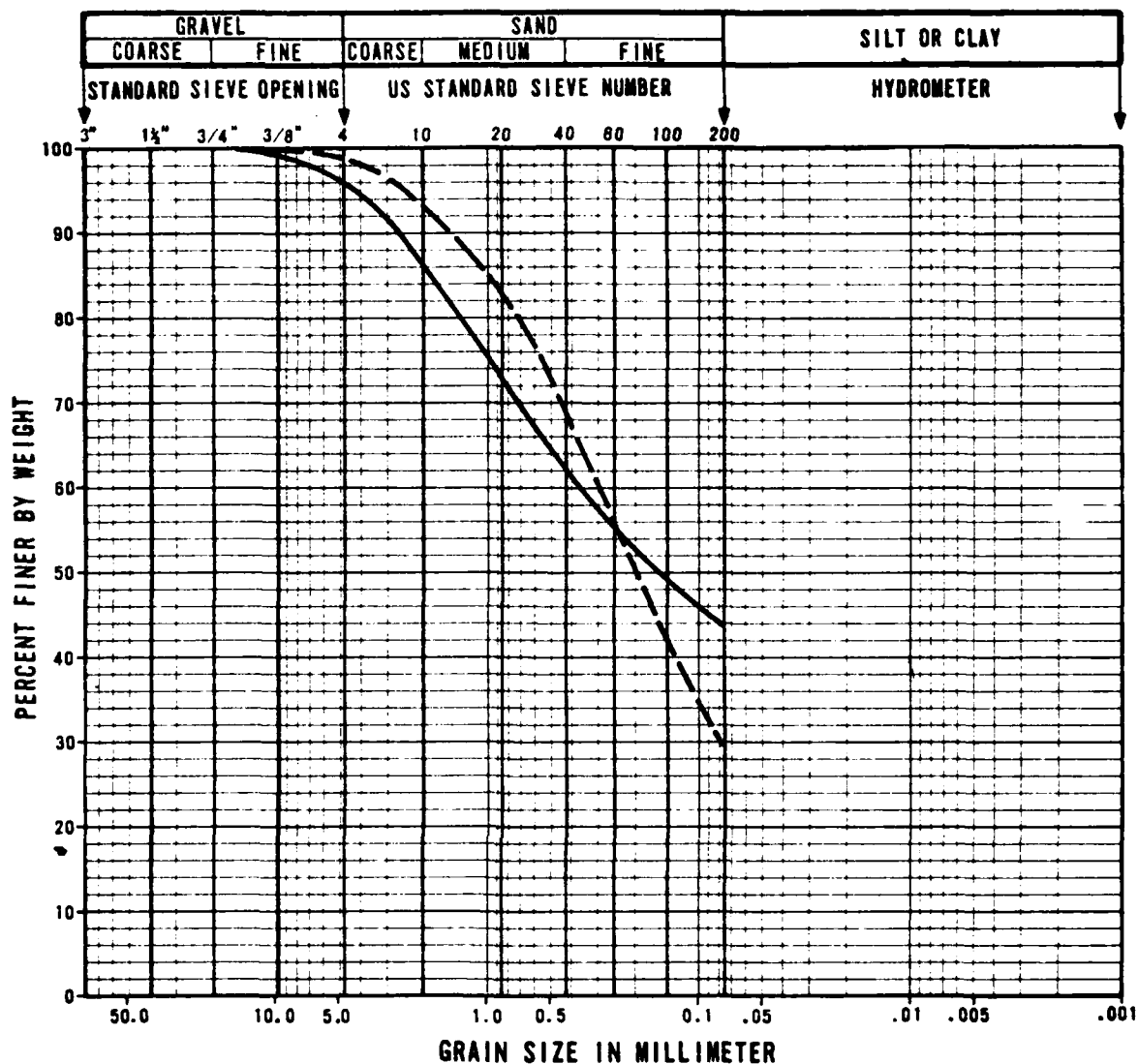
*COMPOSITE SAMPLE

COMPACTION TEST RESULTS LEGHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-121

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-1	B-1	0.5-1.0	0.15-0.30	27	19	8	SC
- - -	LD-A-1	S-2	5.8-7.3	1.77-2.23		NP		SM

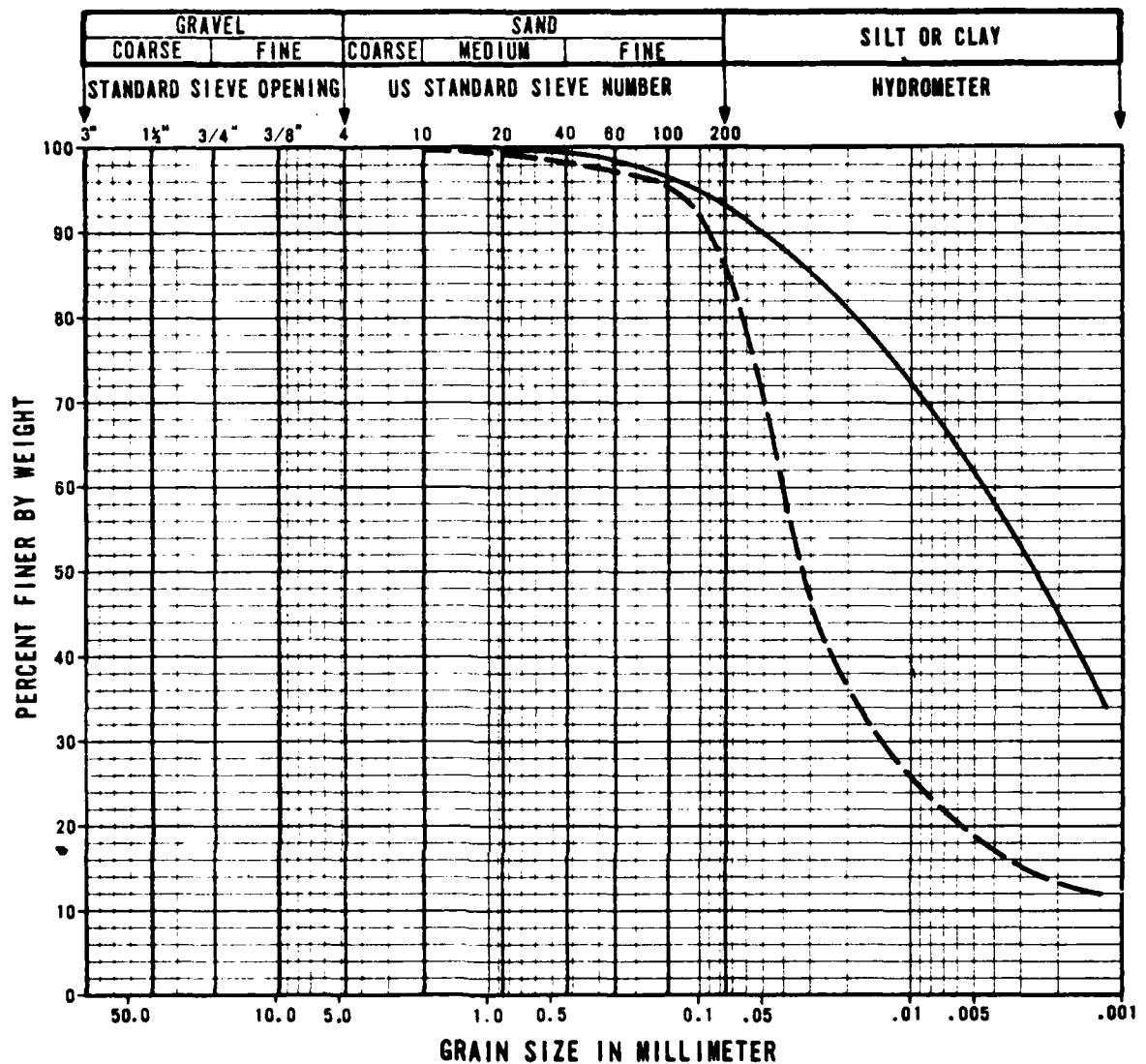
GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-122

FUGRO NATIONAL, INC.



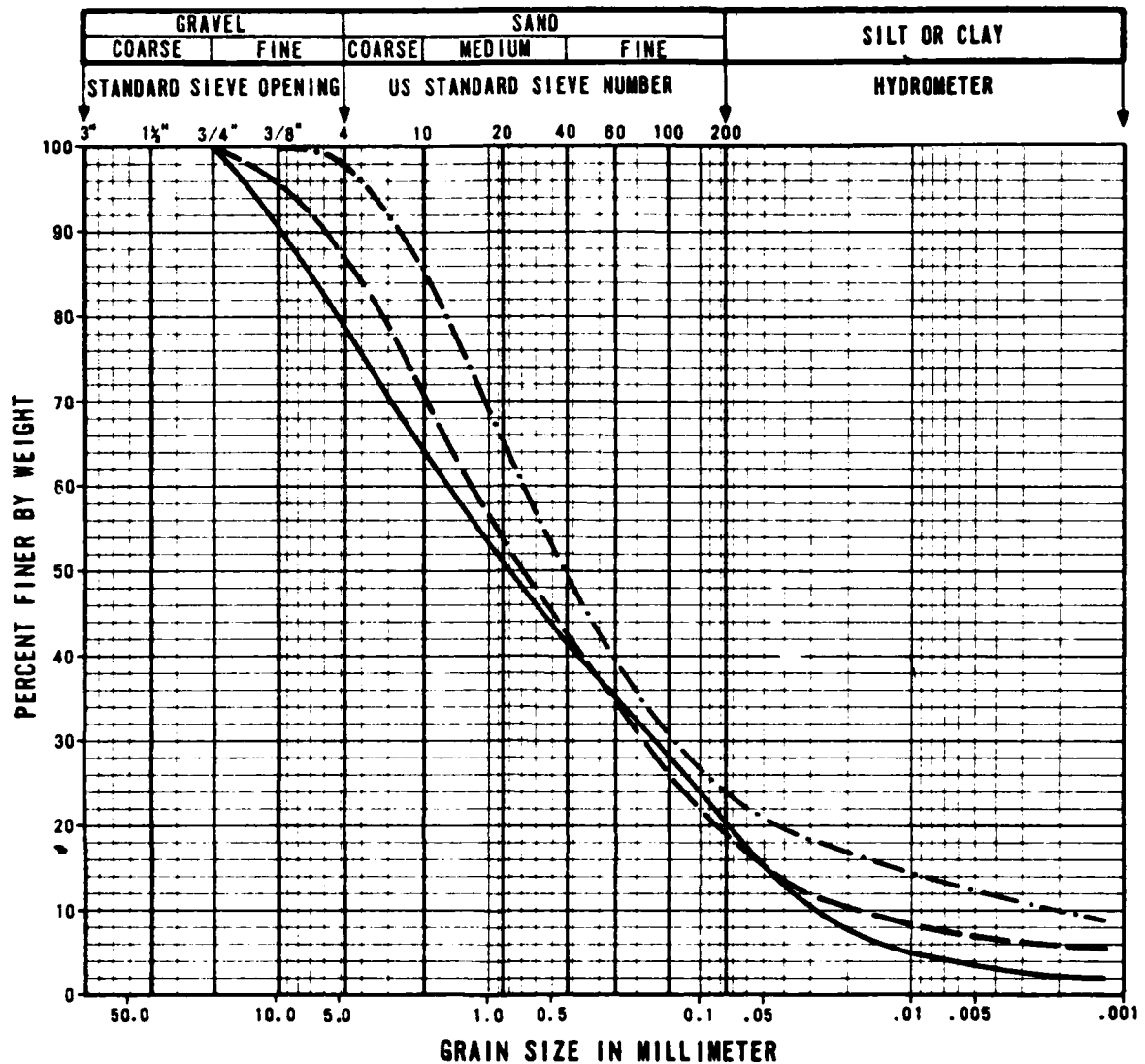
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-1	D-5	16.5-17.3	5.03-5.27	60	23	37	CH
- - -	LD-A-1	S-8	40.0-40.8	12.19-12.44				ML

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-123

FUGRO NATIONAL, INC.



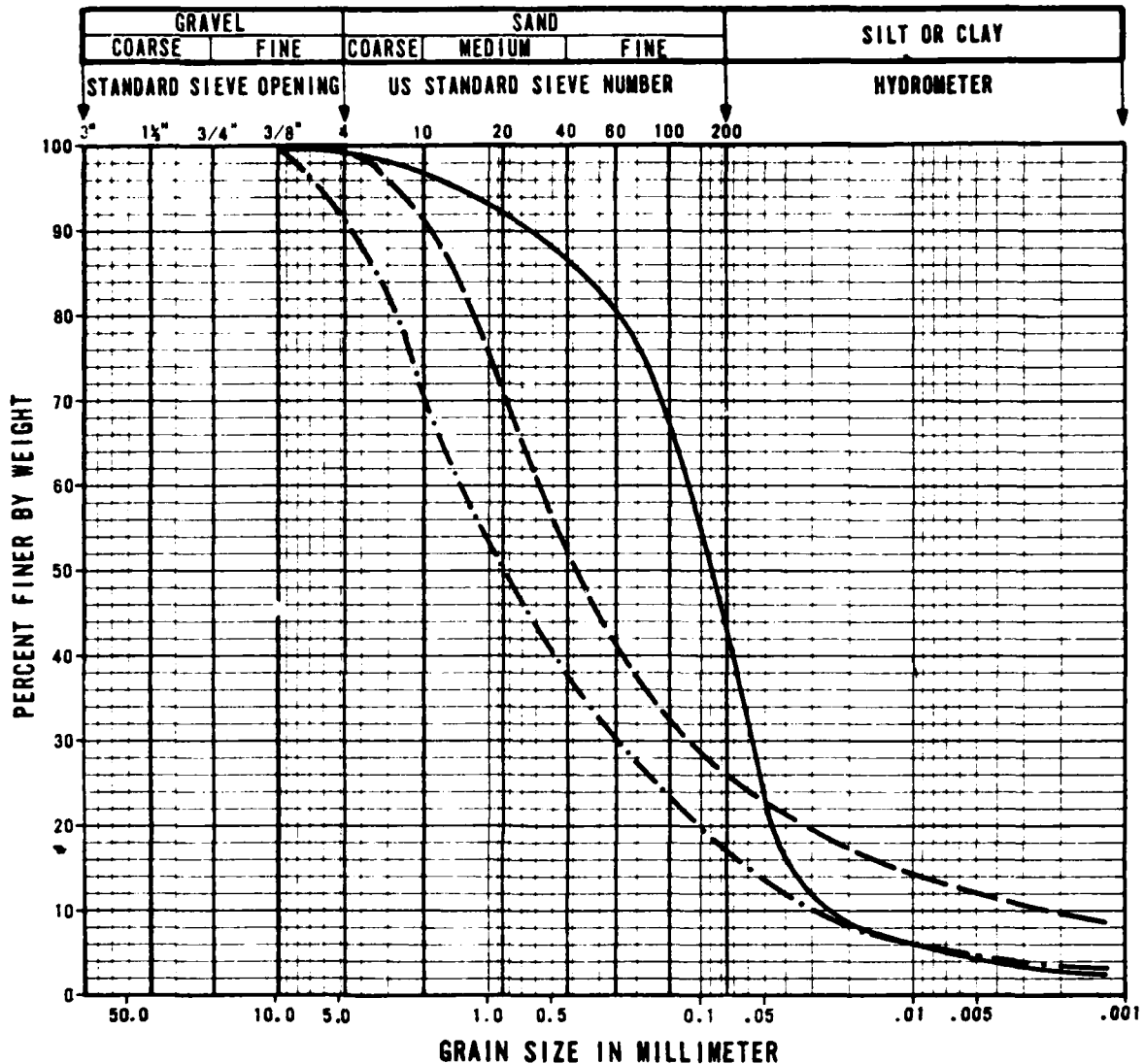
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-2	B-1	0.0-0.1	0.00-0.15		NP		SM
- - -	LD-A-2	S-5	20.0-20.4	6.10-6.22		NP		SM
- · -	LD-A-2	S-8	35.0-35.4	10.67-10.79				SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-124

FUGRO NATIONAL, INC.



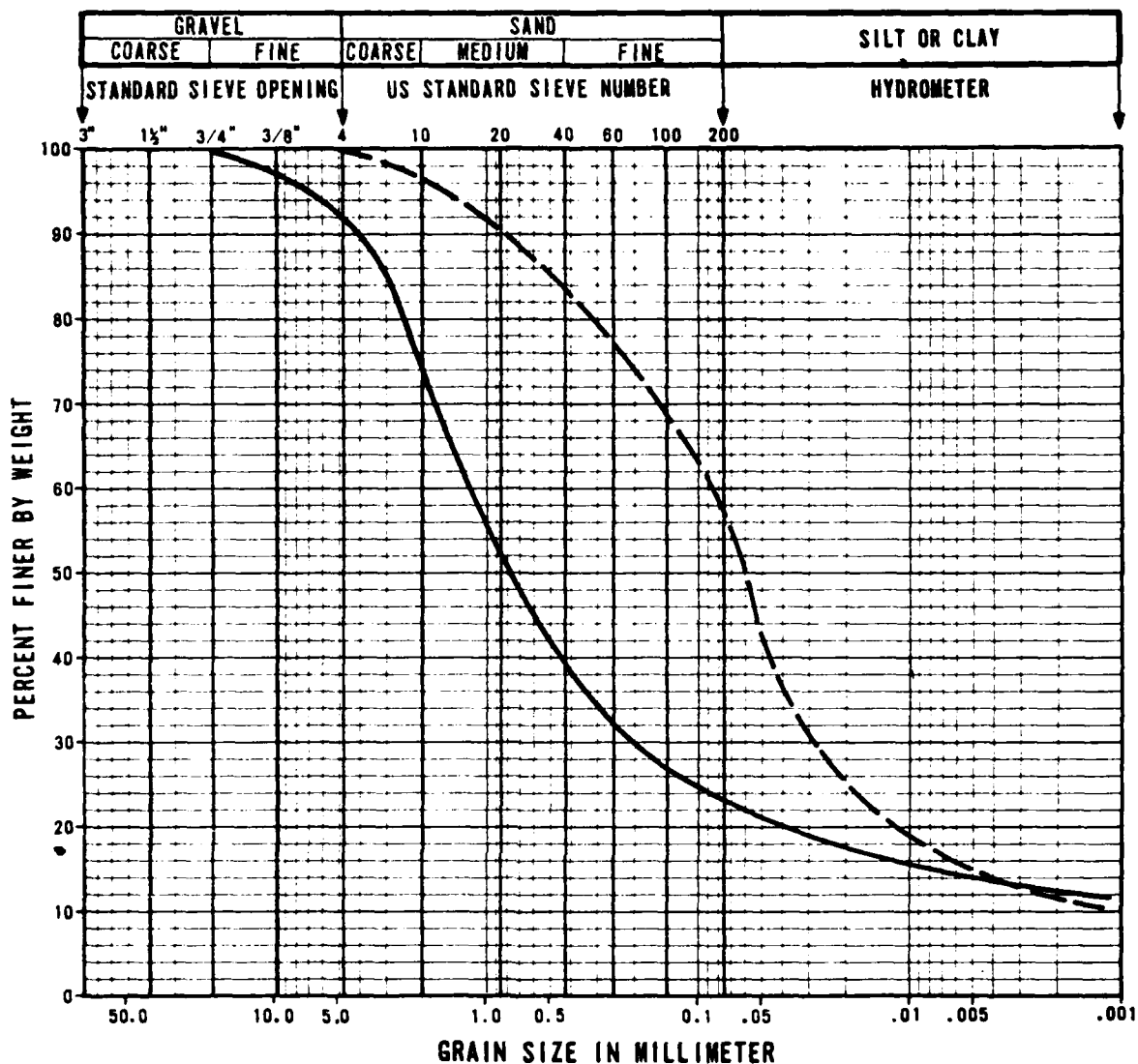
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-3	B-1	0.0-0.5	0.00-0.15		NP		SM
- -	LD-A-3	B-4	11.0-15.0	3.35-4.57	46	22	24	SC
- · -	LD-A-3	S-8	25.0-26.5	7.62-8.08				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-125

FUGRO NATIONAL, INC.



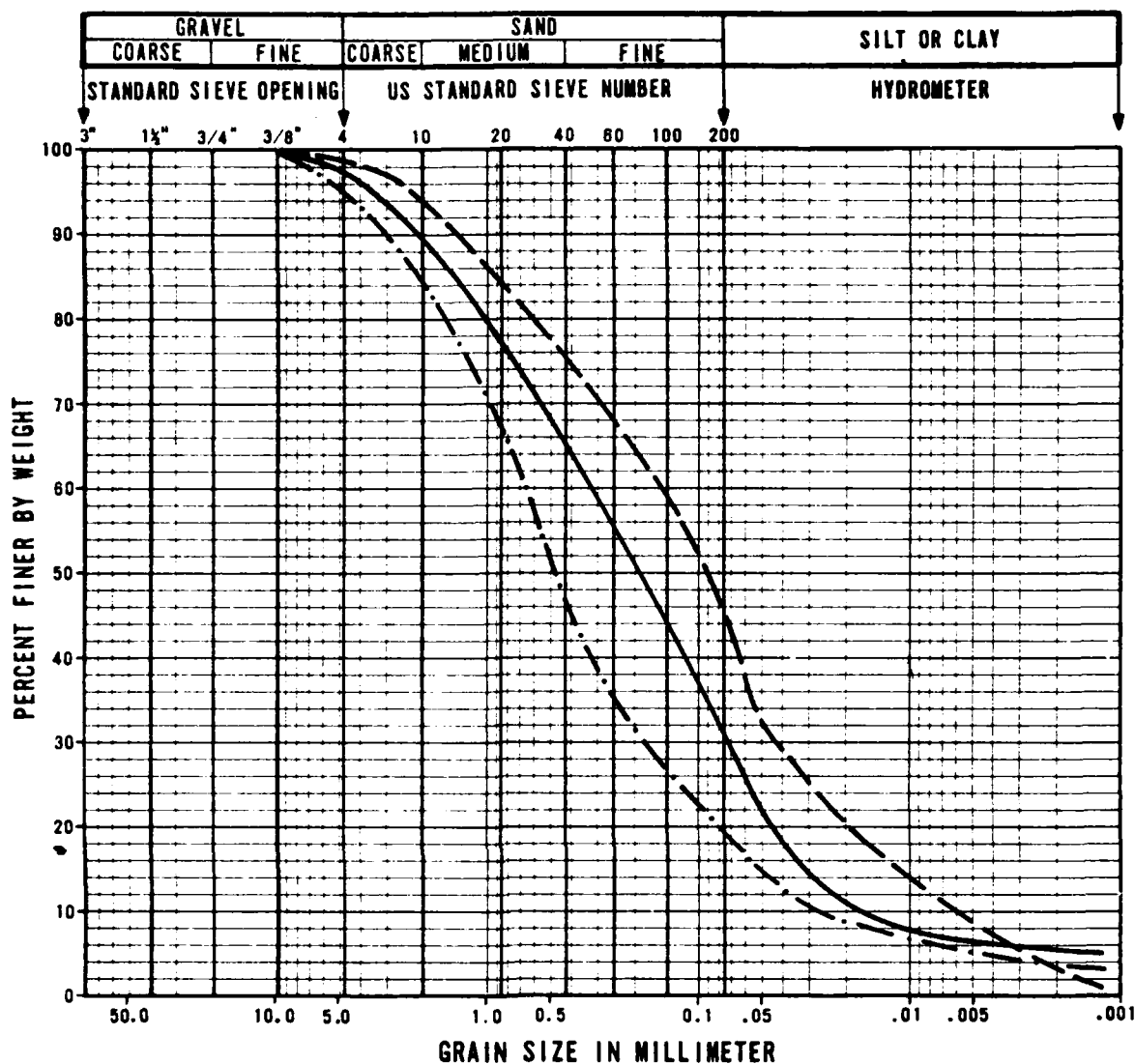
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-3	S-10	35.0-35.7	10.67-10.88	29	19	10	SC
- -	LD-A-3	S-13	50.0-51.0	15.24-15.54	34	20	14	CL

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-126

FUGRO NATIONAL, INC.



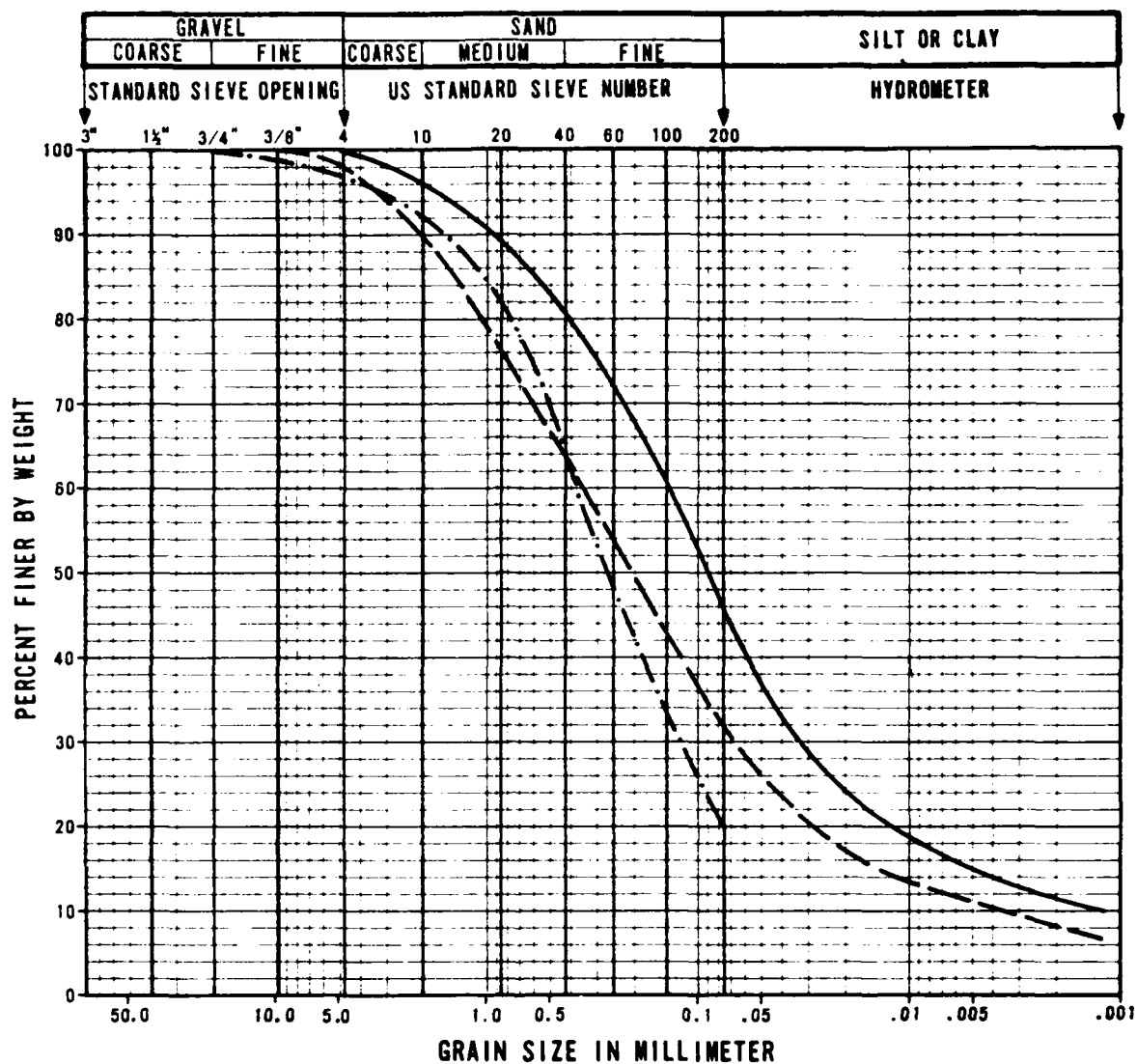
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-4	B-1	0.0-5.0	0.00-1.52		NP		SM
- - -	LD-A-4	D-2	5.75-6.25	1.75-1.91	25	19	6	SC/SM
- · - · -	LD-A-4	D-3	10.75-11.25	3.28-3.43	23	20	3	SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-127

FUGRO NATIONAL, INC.



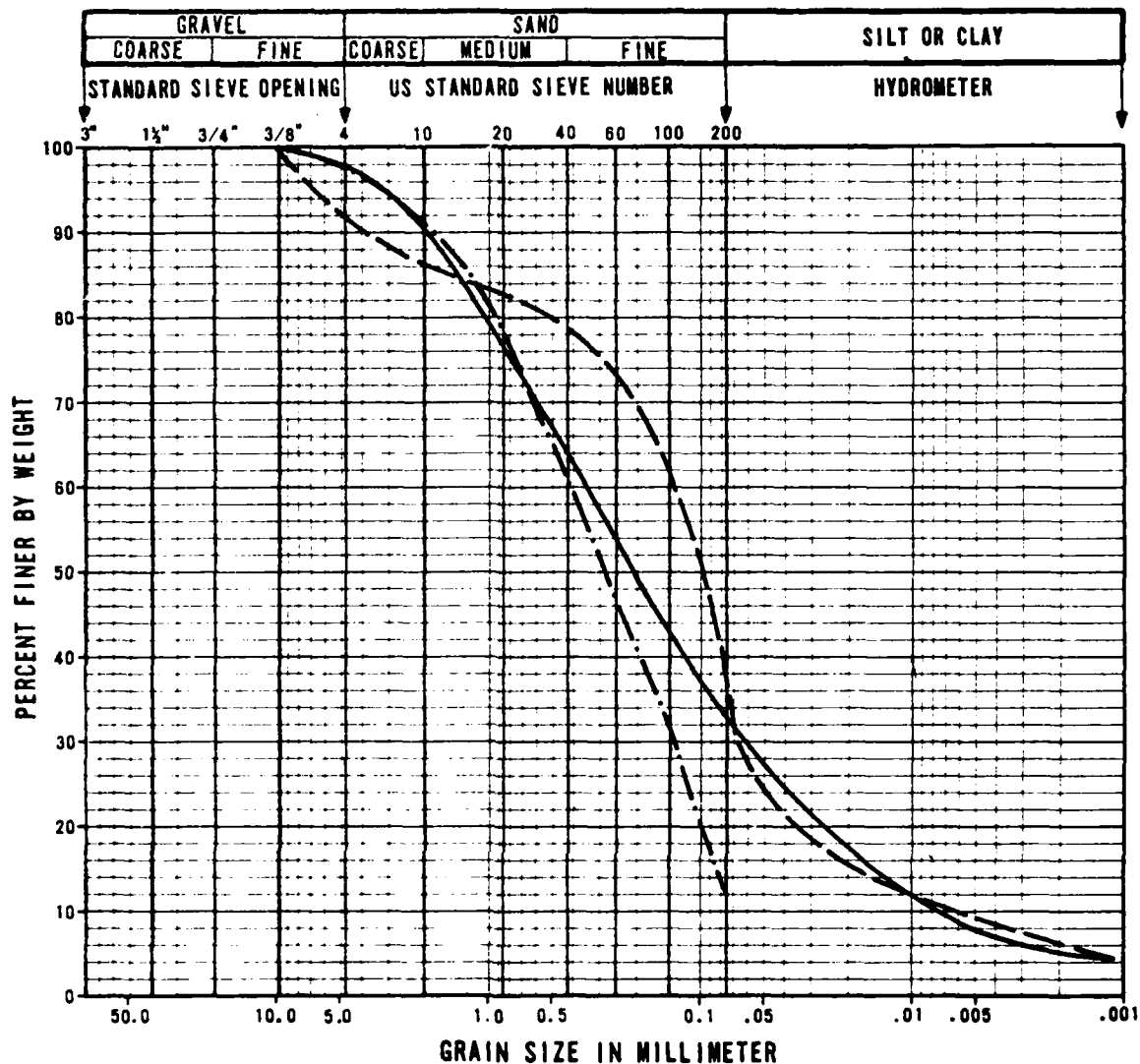
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-4	D-4	15.6-16.1	4.75-4.91	31	18	13	SC
- -	LD-A-4	D-7	25.5-26.0	7.77-7.92	29	20	9	SC
- · -	LD-A-4	D-11	45.5-46.0	13.87-14.02		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-128

FUGRO NATIONAL, INC.



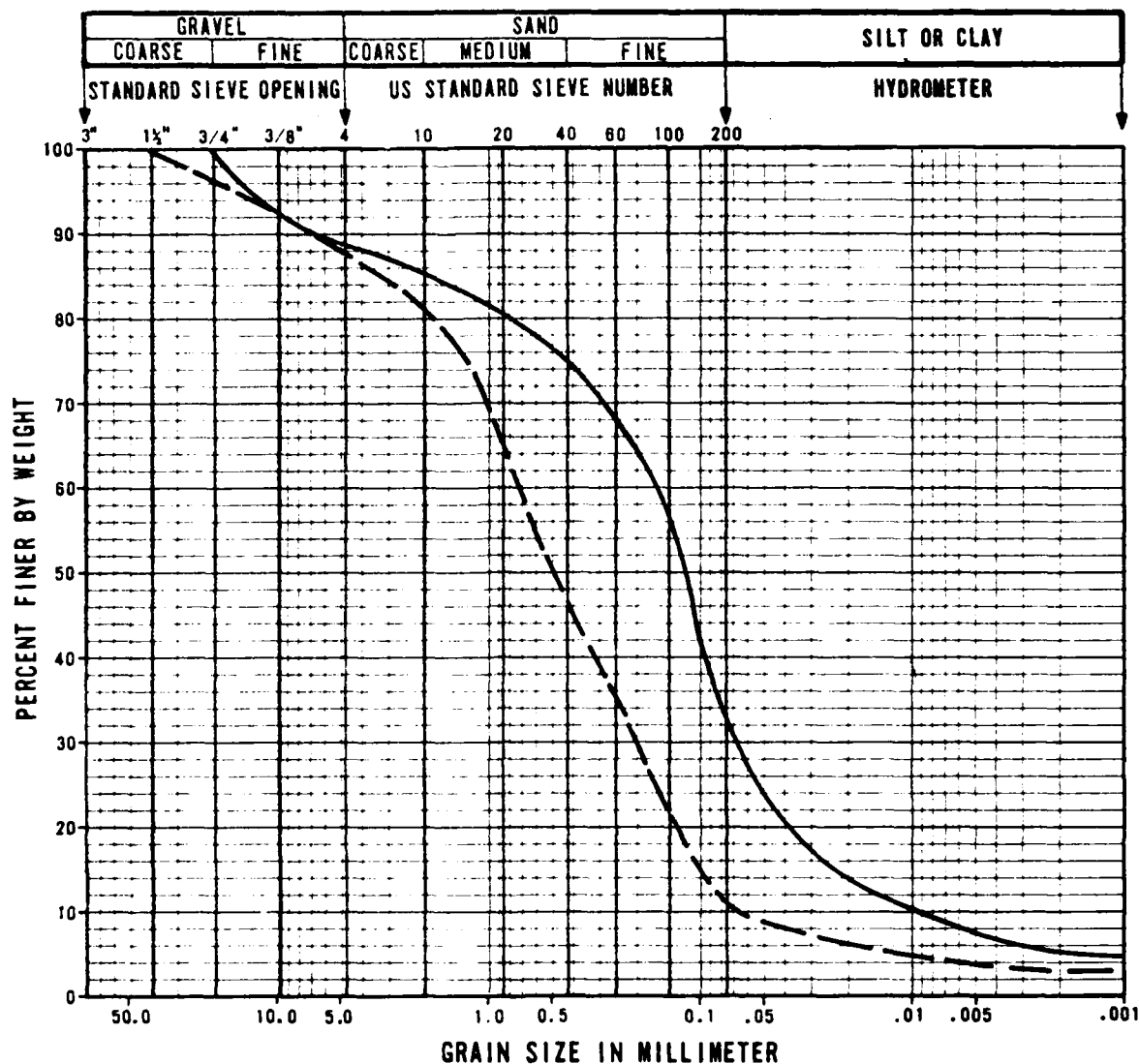
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-5	D-3	10.5-11.0	3.20-3.35	23	20	3	SM
- - -	LD-A-5	D-5	25.5-26.0	7.77-7.92	32	23	9	SC
- · -	LD-A-5	D-6	30.0-31.5	9.14-9.60				SP/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-129

FUGRO NATIONAL, INC.



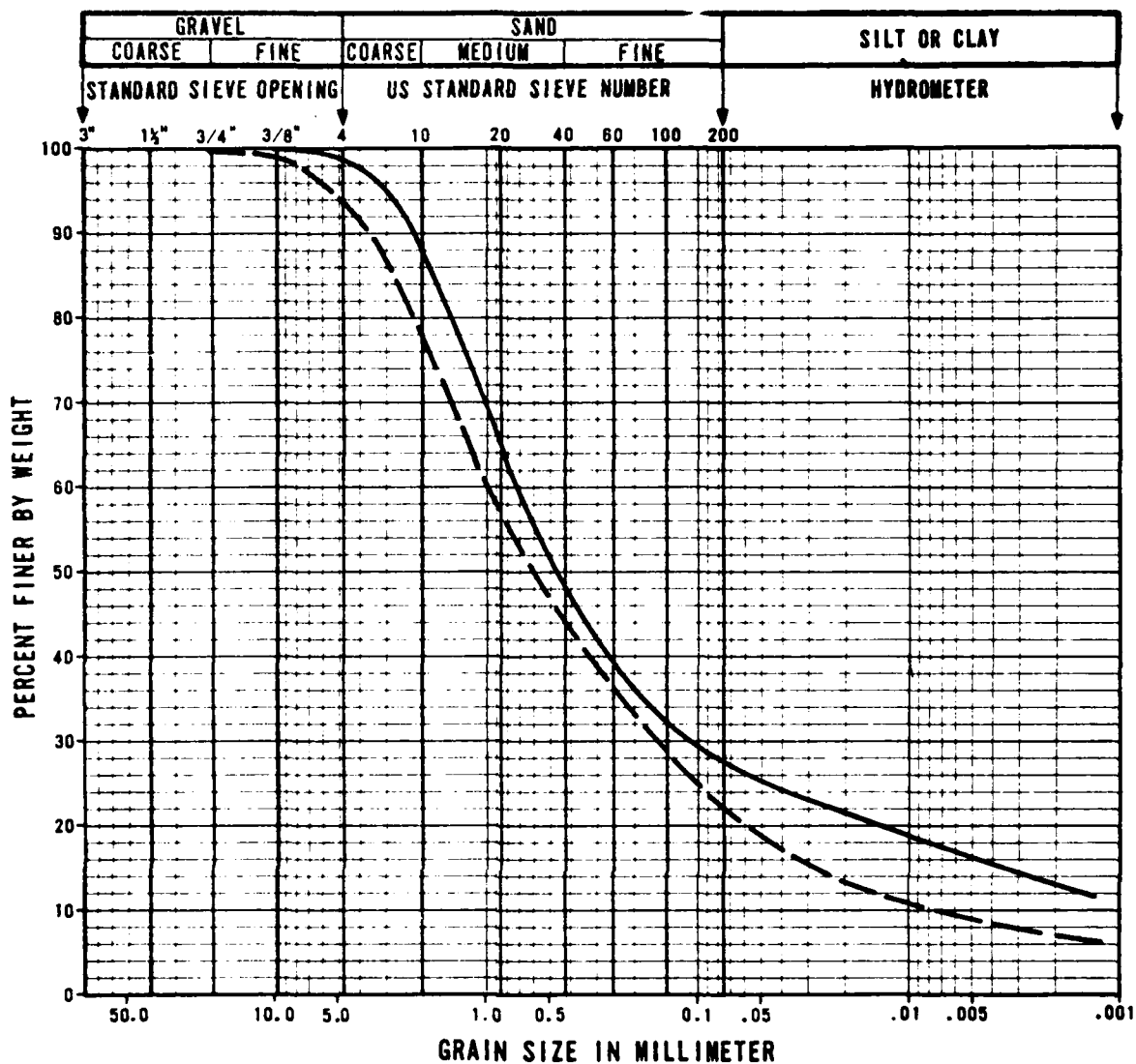
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-5	D-9	45.5-46.0	13.87-14.02		NP		SM
- - -	LD-A-5	D-10	50.0-50.5	15.24-15.39		NP		SP/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-130

FUGRO NATIONAL, INC.



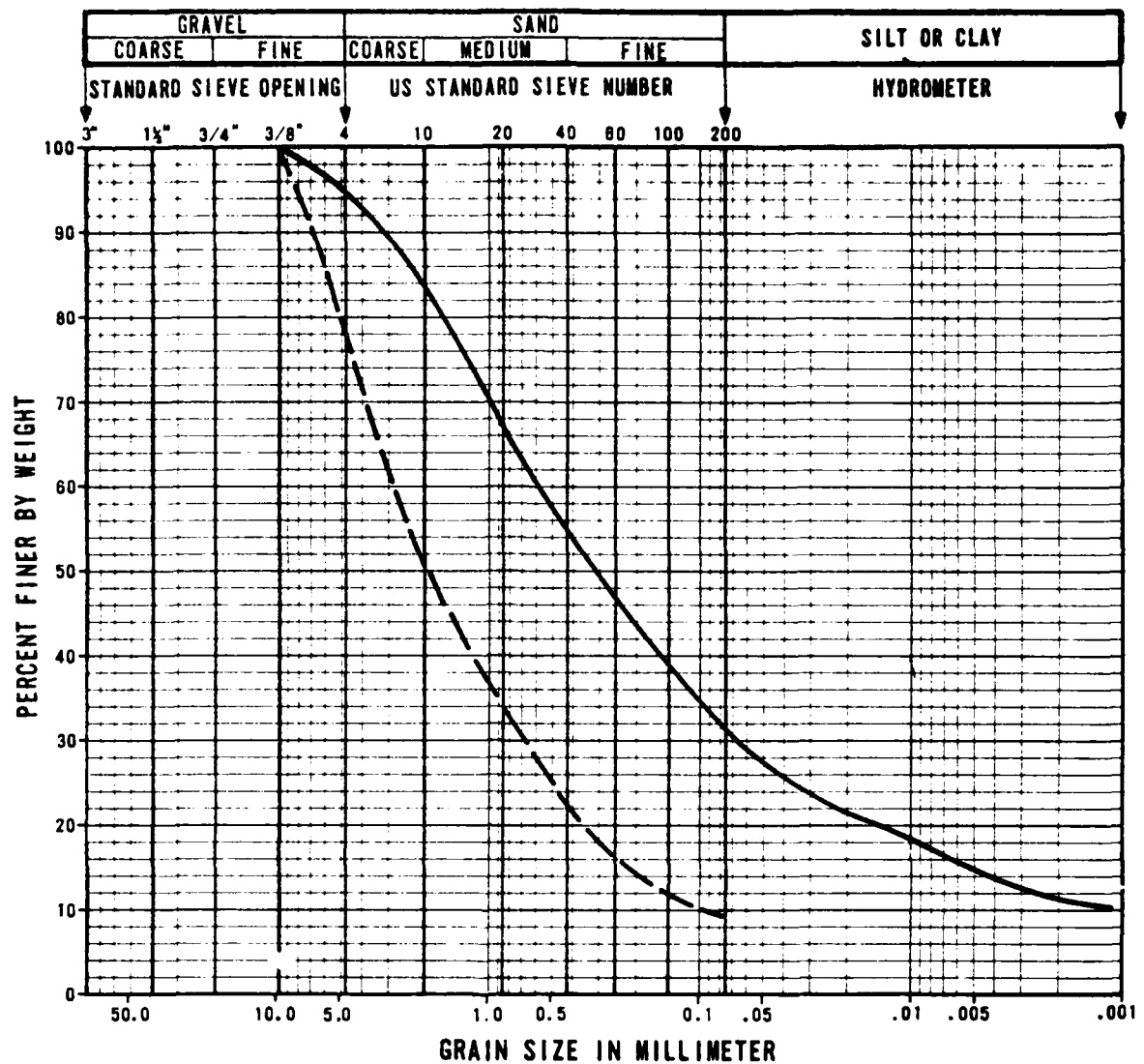
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-6	B-3	10.0-15.0	3.05-4.57	41	20	21	SC
- - -	LD-A-6	D-6	25.5-26.0	7.77-7.92	68	29	39	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-131

FUGRO NATIONAL, INC.



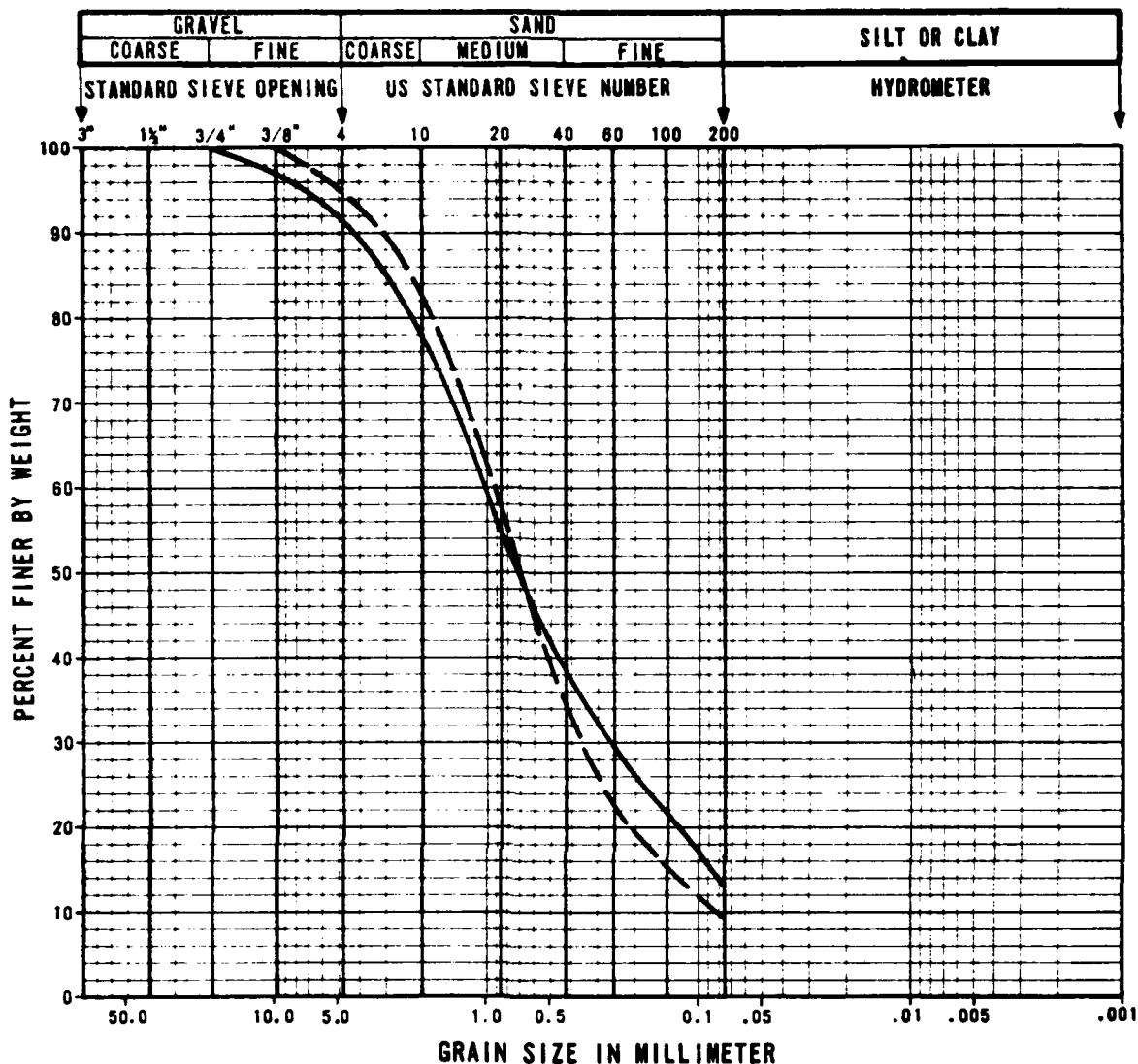
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-6	D-9	40.5-41.0	12.34-12.50	40	18	22	SC
- - -	LD-A-6	D-10	45.5-46.0	13.87-14.02	36	26	10	SW/SN

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-132

UGRO NATIONAL, INC.



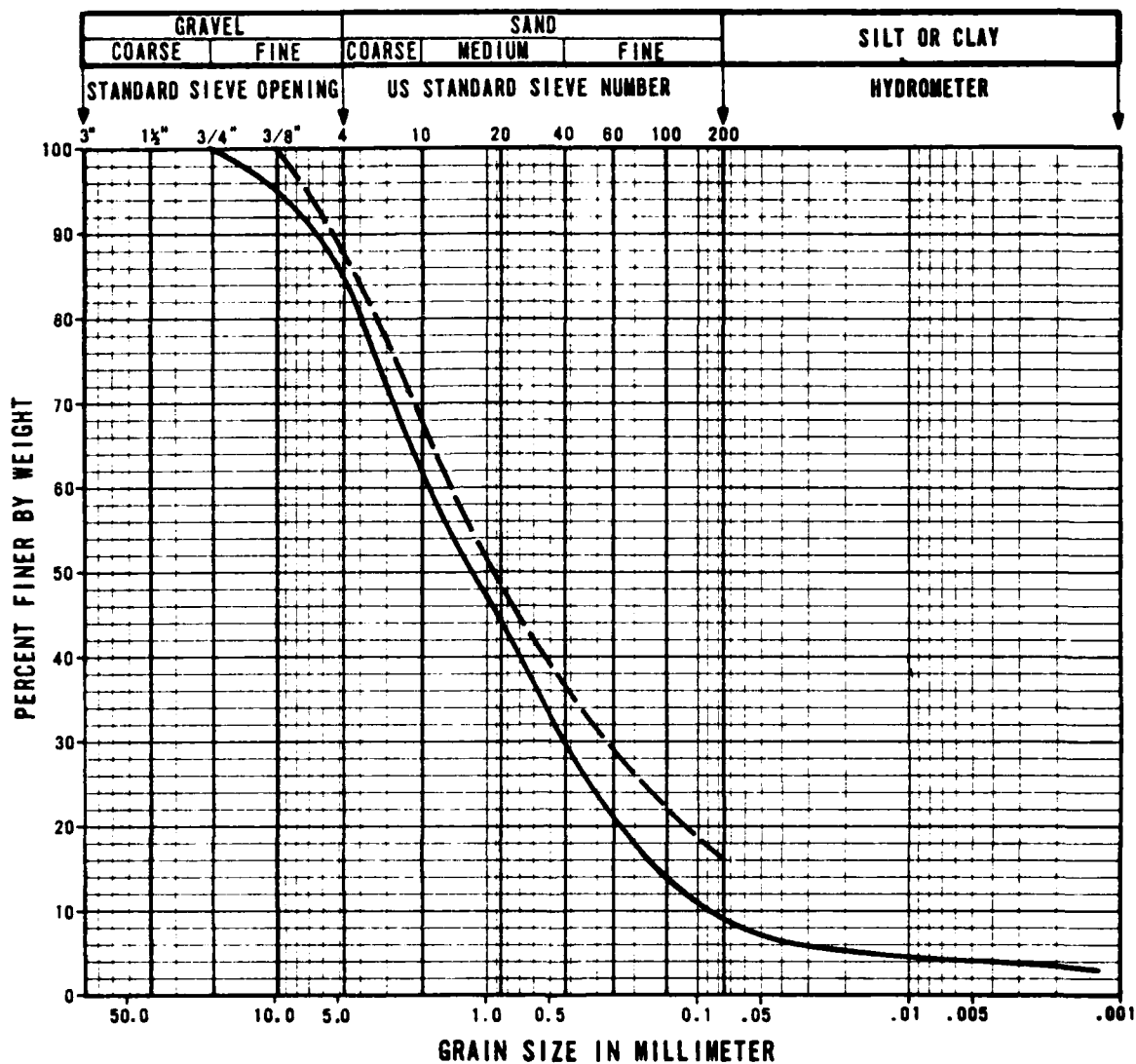
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-7	0-2	10.5-11.0	3.20-3.35		NP		SM
- - -	LD-A-7	B-4	10.0-20.0	3.05-3.10		NP		SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-133

FUGRO NATIONAL, INC.



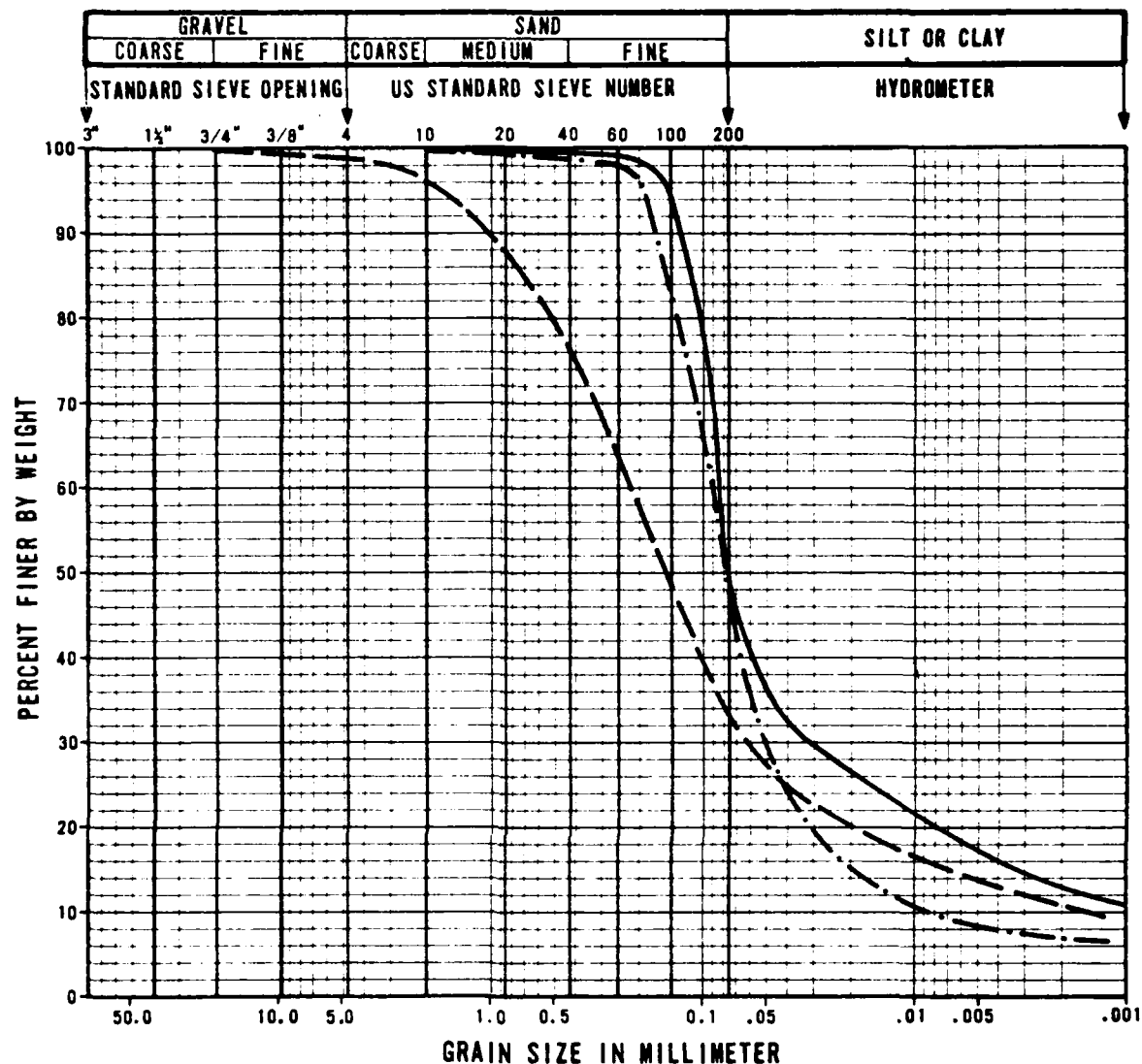
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-7	D-6	22.0-22.5	6.71-6.86				SW/SM
- - -	LD-A-7	D-10	41.5-42.0	12.65-12.81				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-134

FUGRO NATIONAL, INC.

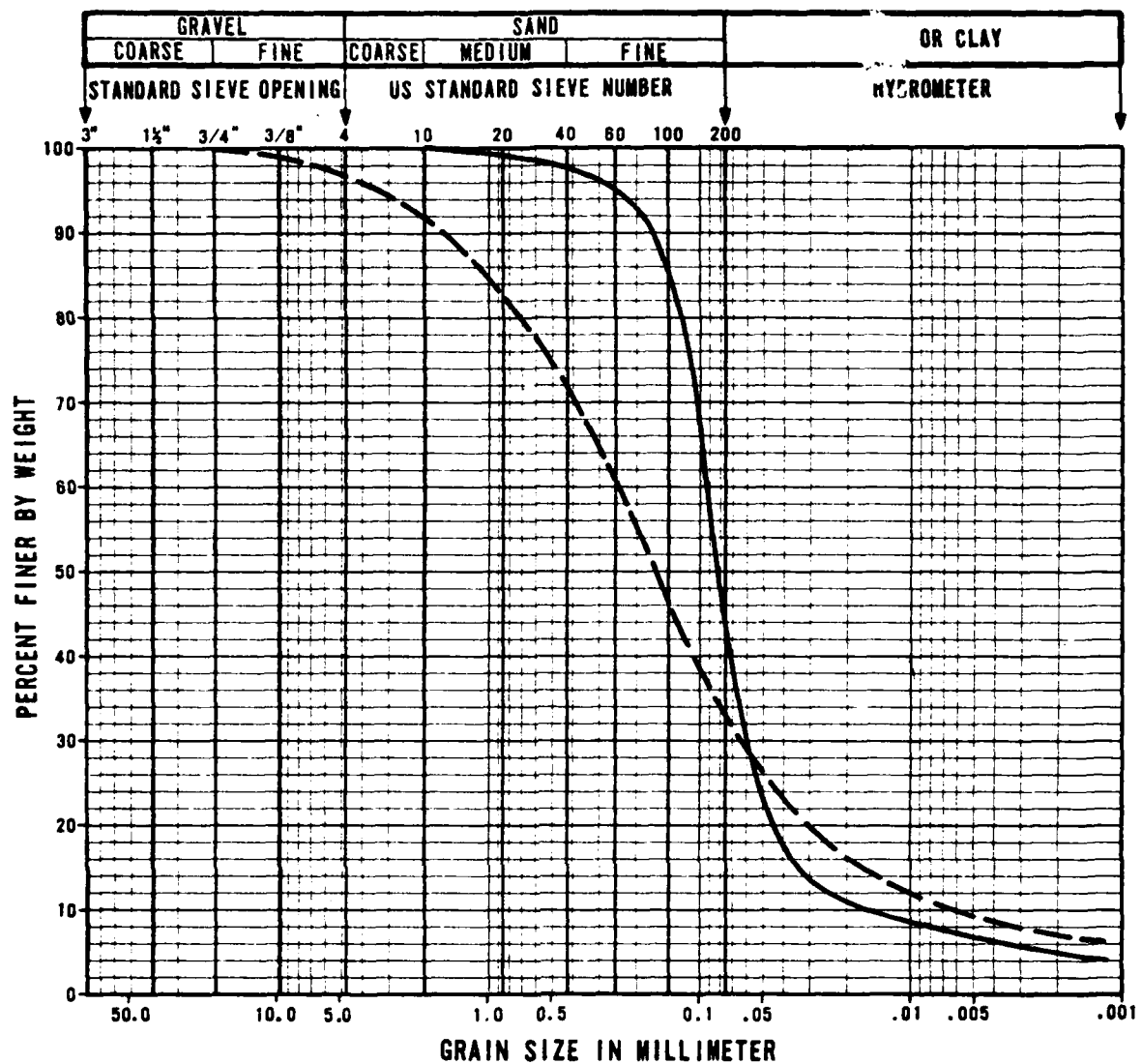


GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-135

FUGRO NATIONAL, INC.



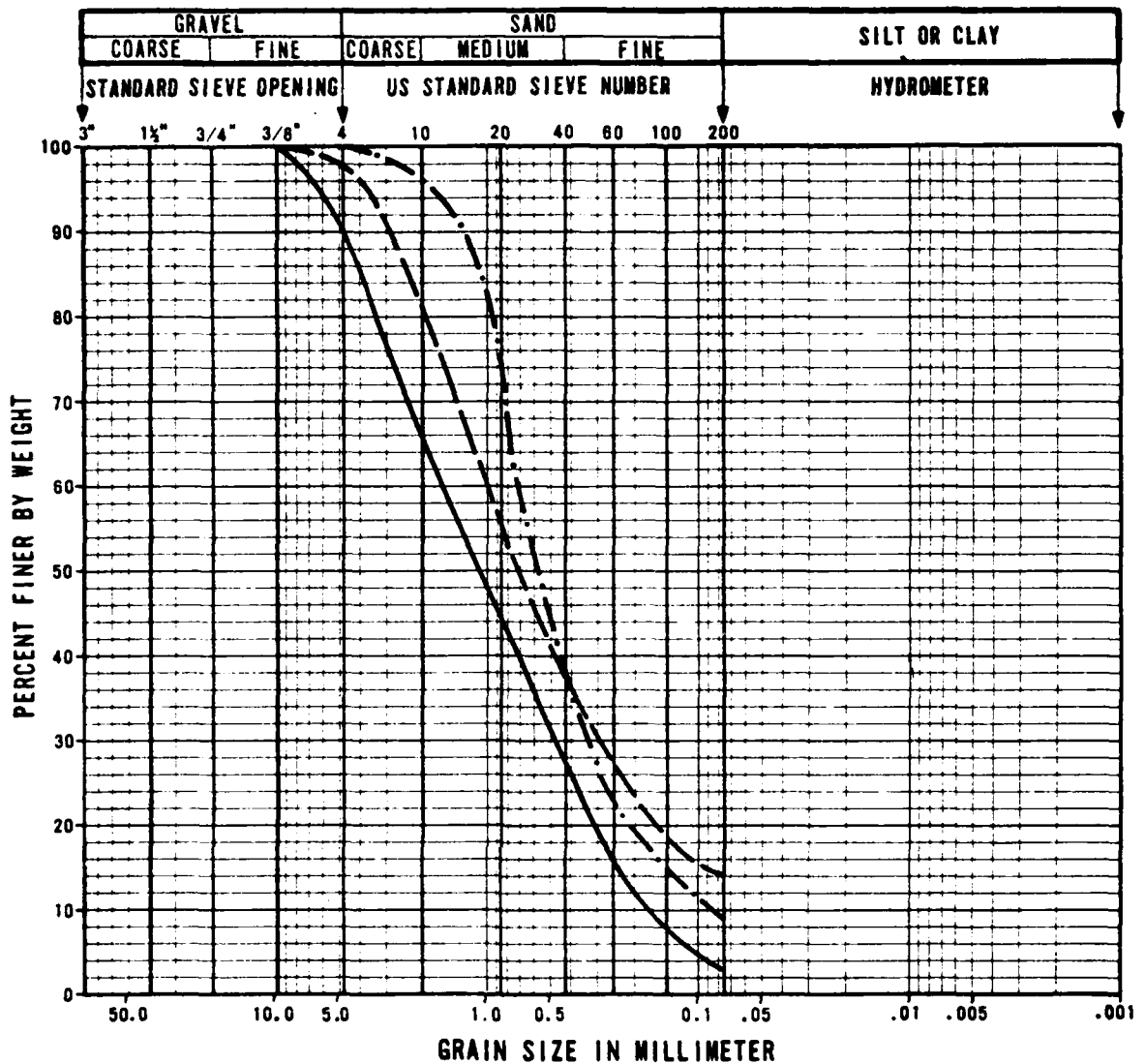
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-8	D-7	30.0-30.4	9.14-9.27		NP		SM
- -	LD-A-8	S-9	40.5-41.4	12.34-12.62		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-136

FUGRO NATIONAL, INC.



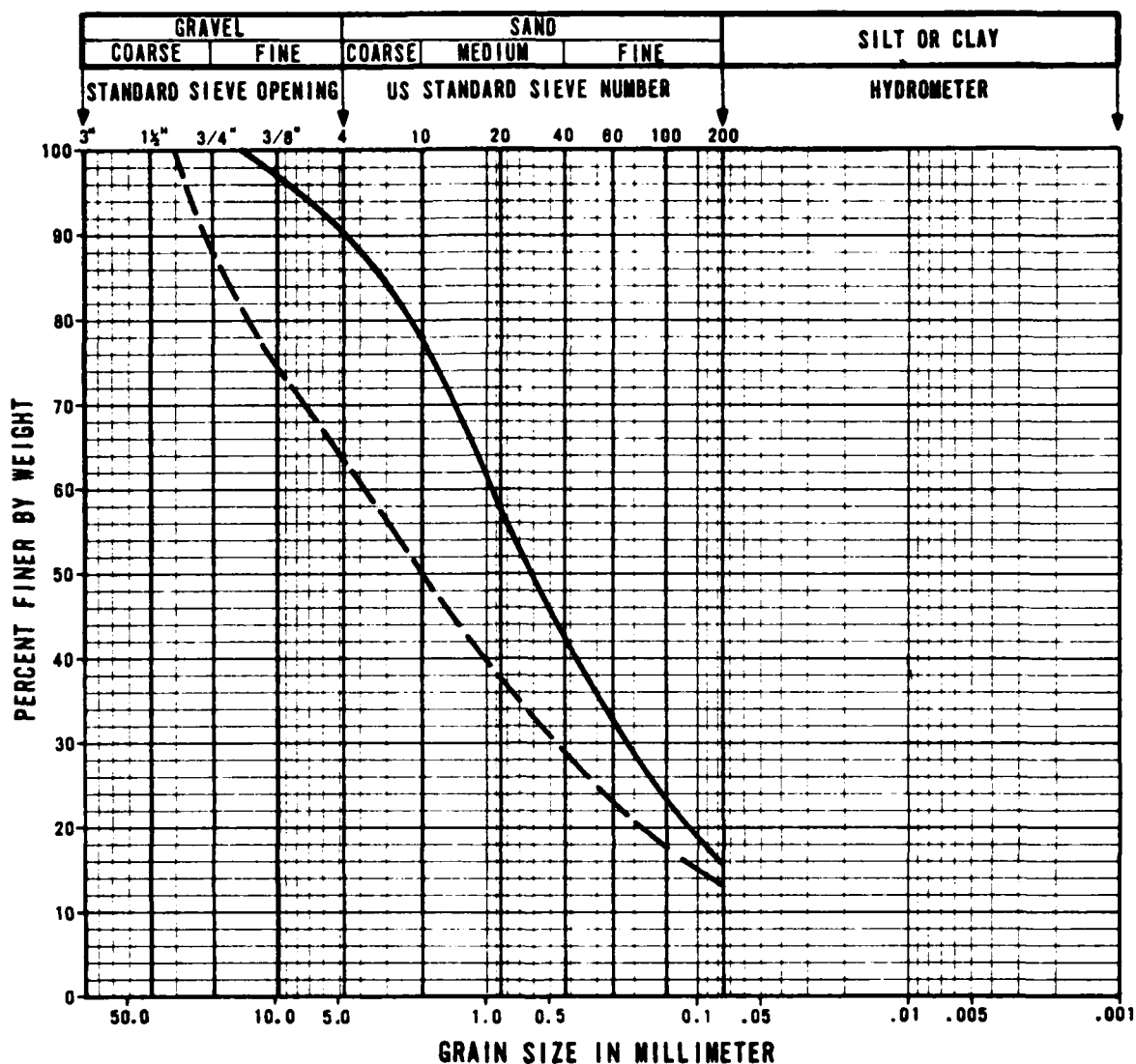
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-9	B-1	0.5-1.5	0.15-0.46				SP
- - -	LD-A-9	B-3	5.0-10.0	1.52-3.05		NP		SM
- · -	LD-A-9	S-6	20.0-21.2	6.10-6.46		NP		SW/SW

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-137

FUGRO NATIONAL, INC.



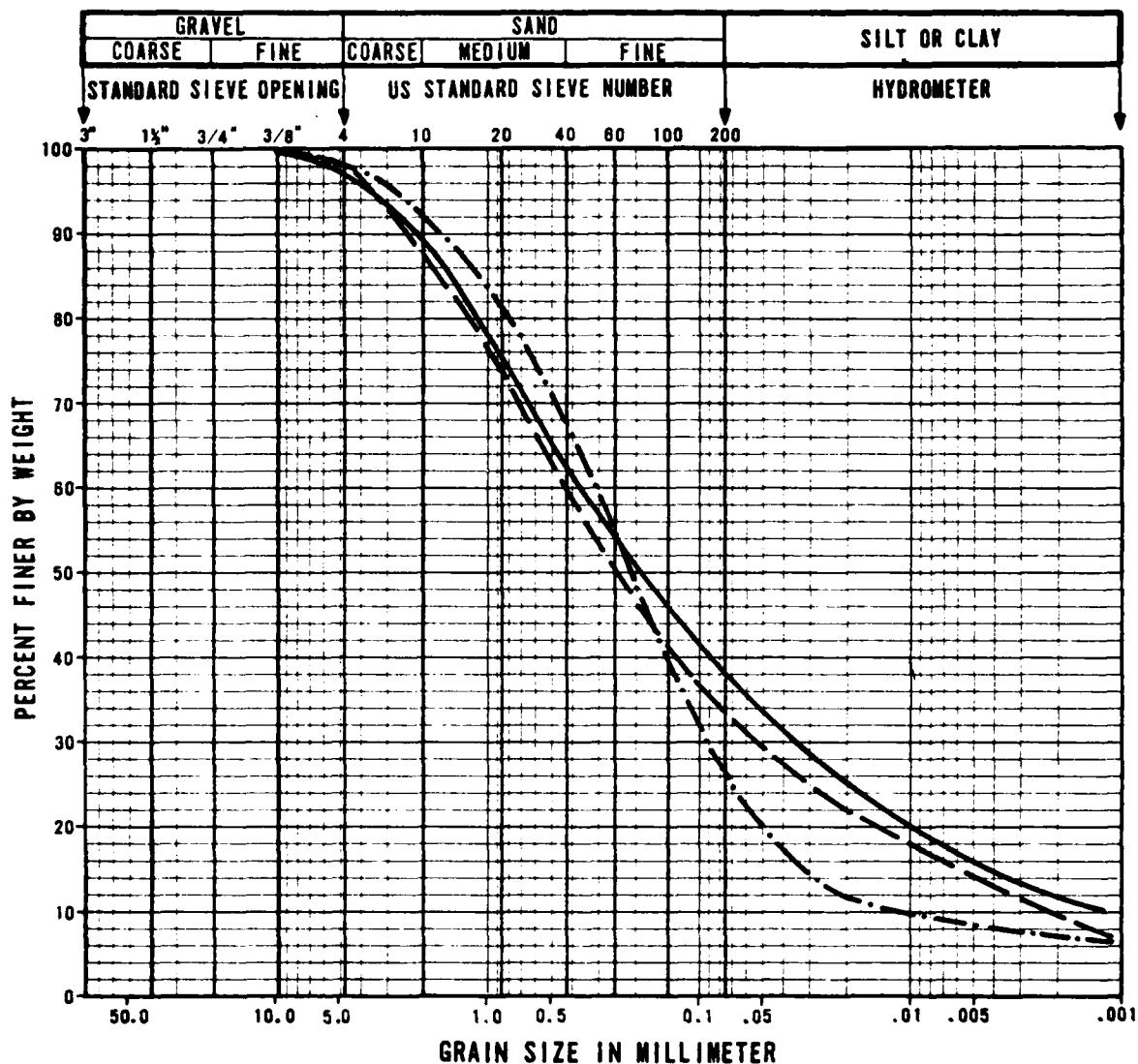
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-9	S-9	35.0-36.0	10.67-10.97		NP		SM
- - -	LD-A-9	D-13	50.1-50.5	15.27-15.39		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-138

FUGRO NATIONAL, INC.



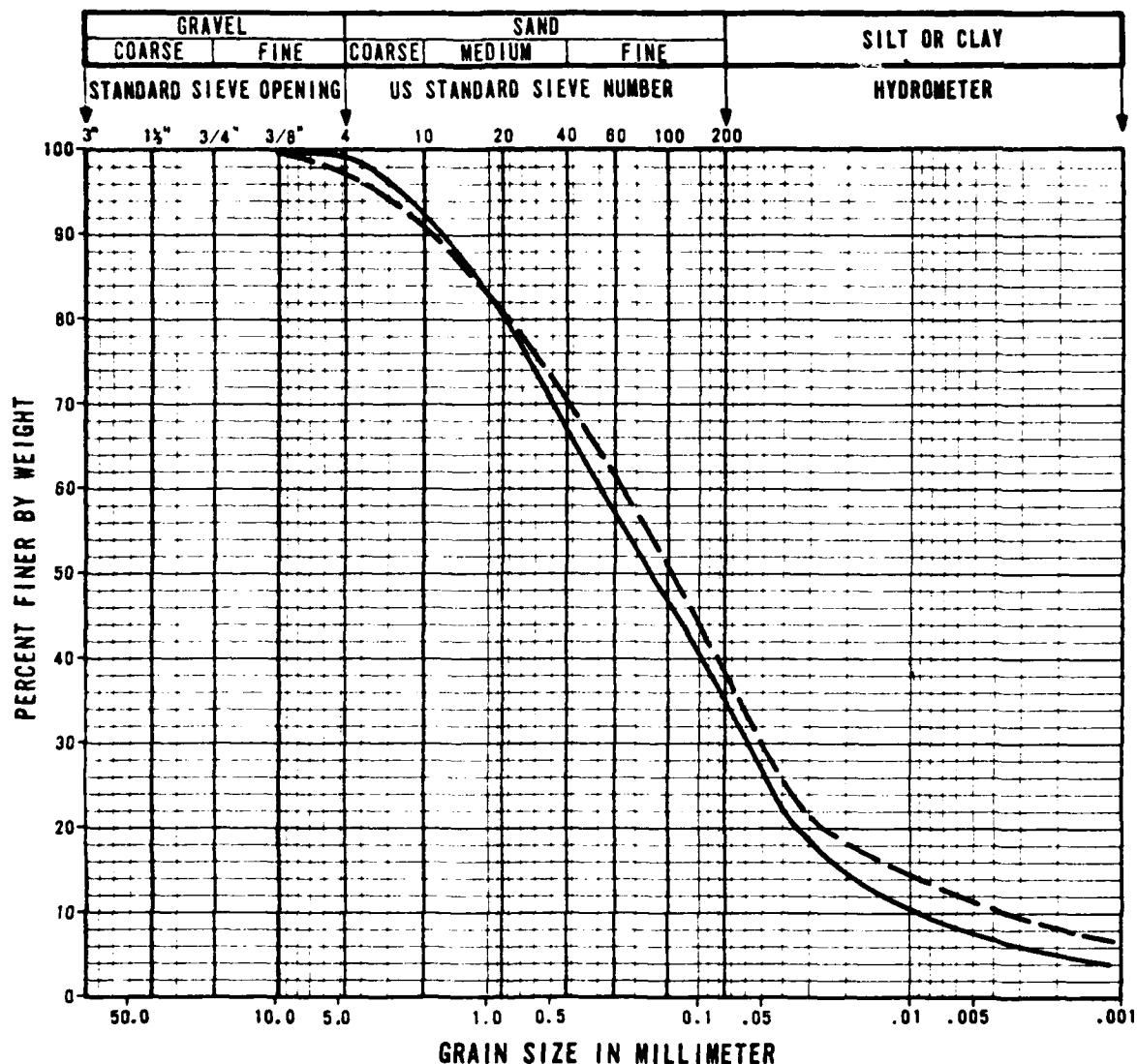
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-10	B-2	5.0-10.0	1.52-3.05	47	20	27	SC
- -	LD-A-10	D-3	10.5-11.0	3.20-3.35	36	22	14	SC
- · -	LD-A-10	D-5	20.5-21.0	6.25-6.40		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-139

FUGRO NATIONAL, INC.



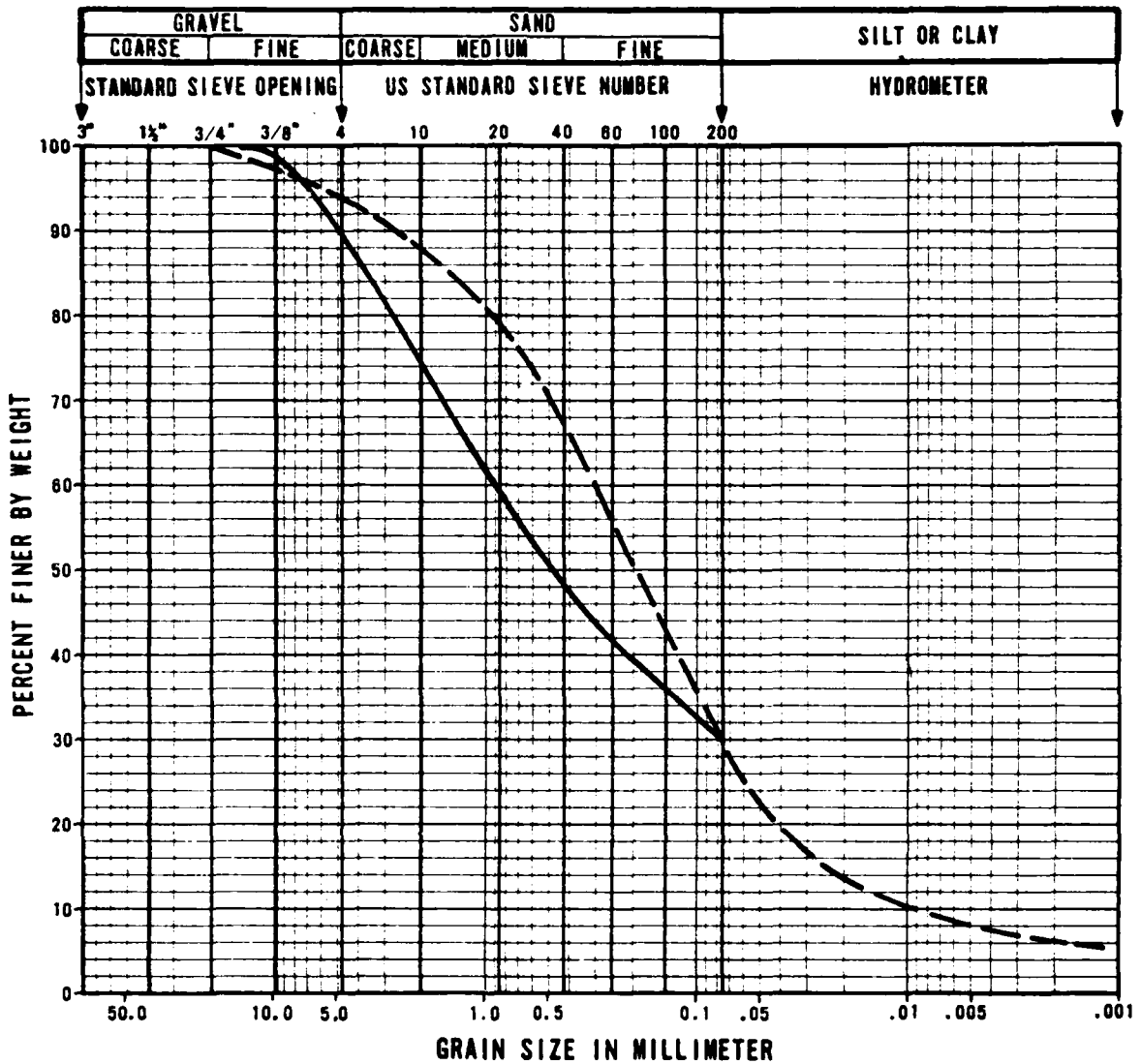
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-10	D-8	35.5-36.0	10.82-10.97		NP		SM
- -	LD-A-10	D-11	50.5-51.0	15.39-15.54	24	21	3	SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-140

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-11	B-1	0.0-0.5	0.00-0.15		NP		SM
- -	LD-A-11	S-2	6.5-8.0	1.98-2.44		NP		SM

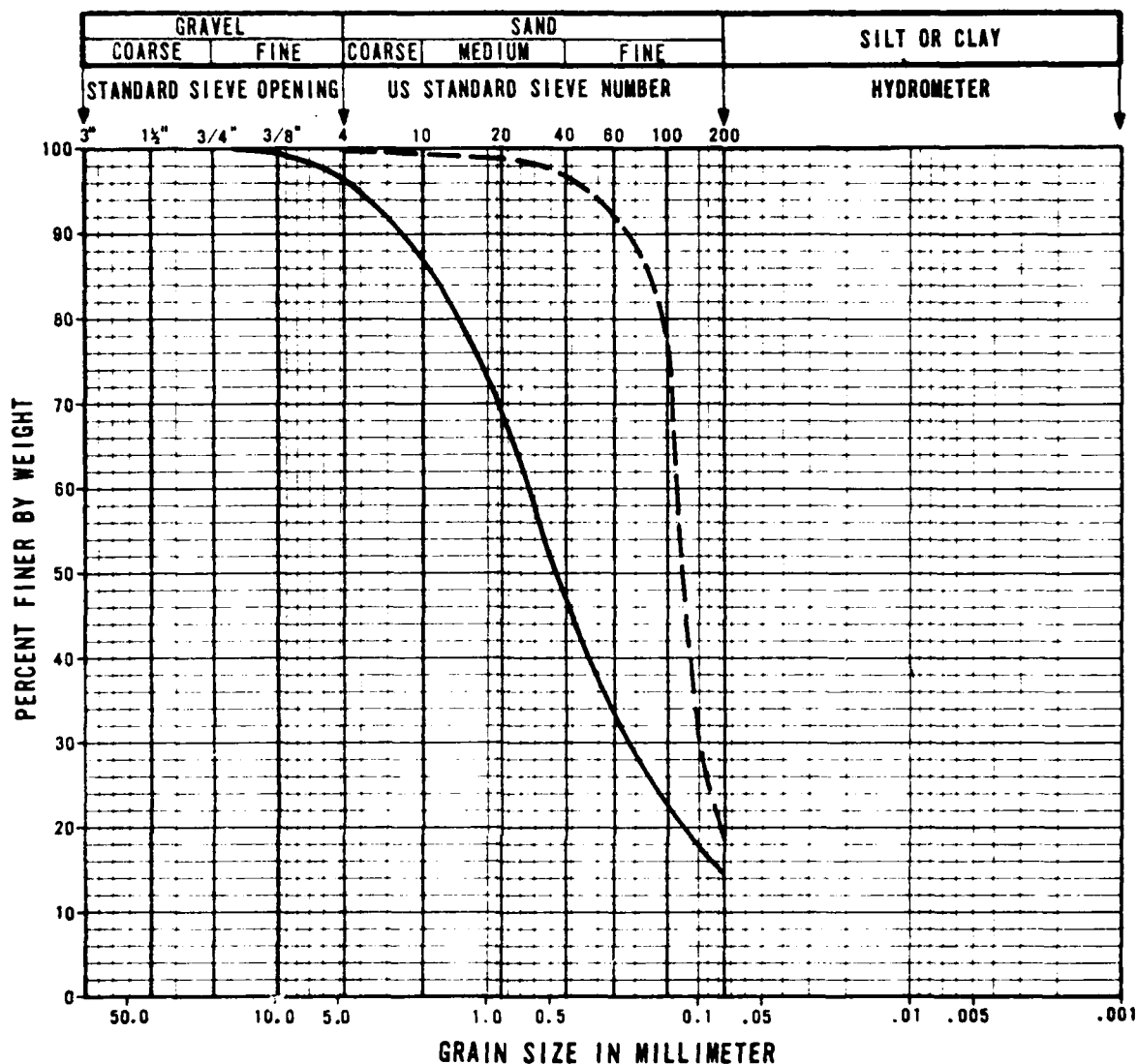
GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-141

FUGRO NATIONAL, INC.



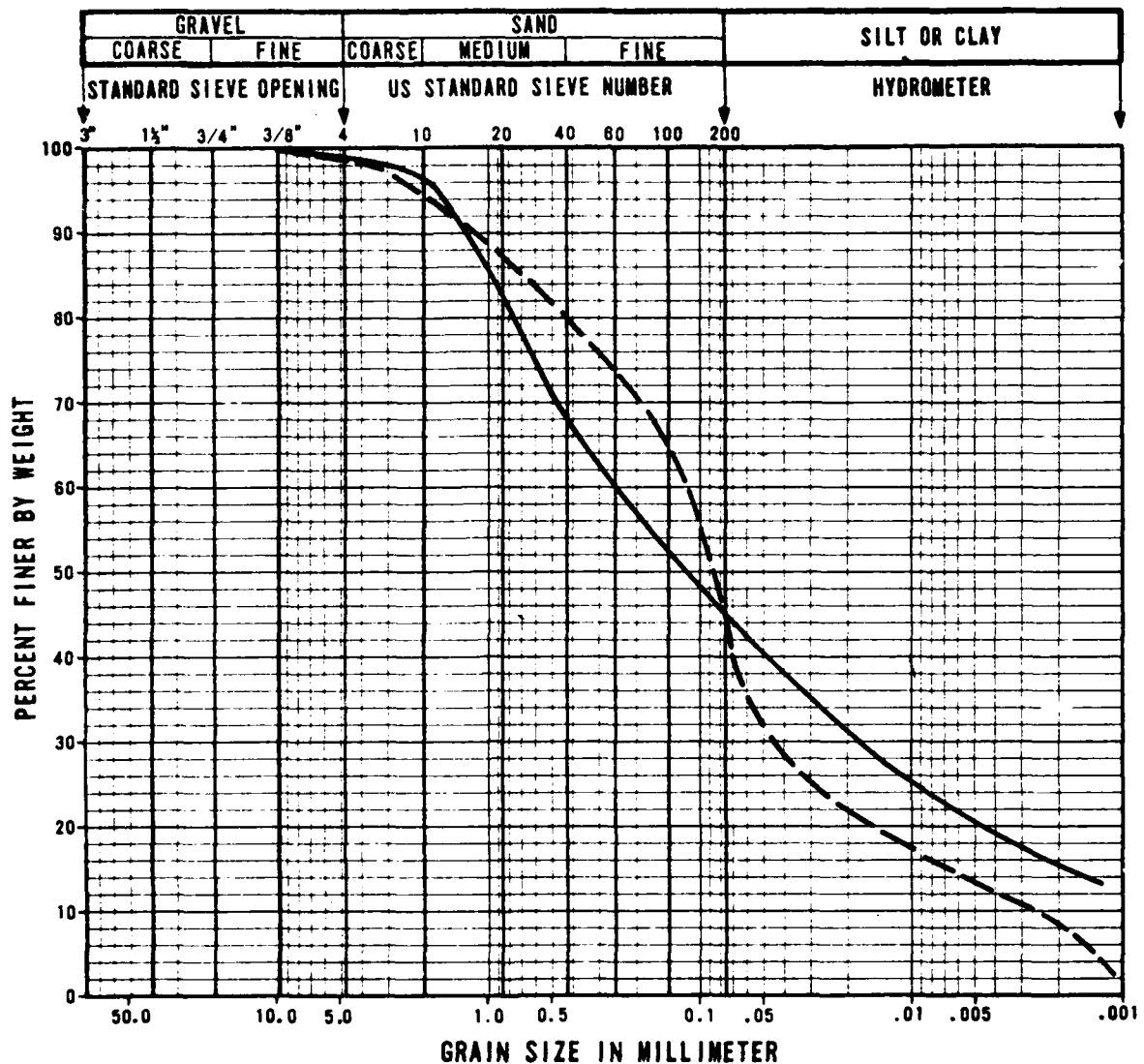
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-11	S-4	16.5-17.5	5.03-5.33				SM
- - -	LD-A-11	S-7	31.5-32.5	9.60-9.91				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
42

FUGRO NATIONAL, INC.



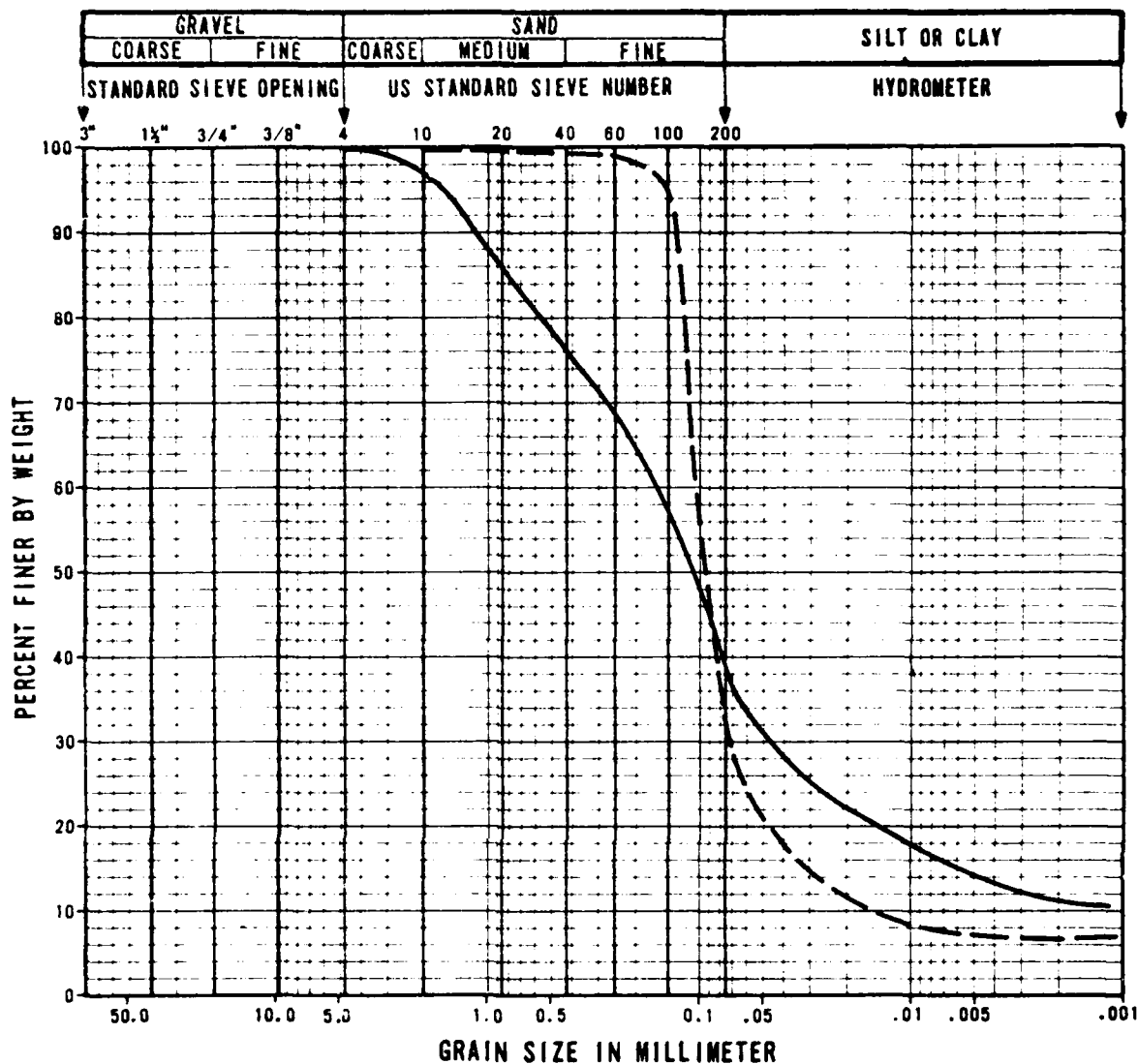
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-12	B-3	6.0-13.5	1.83-4.11	28	16	12	SC
- - -	LD-A-12	D-2	10.5-11.0	3.20-3.35	27	19	8	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-143

FUGRO NATIONAL, INC.



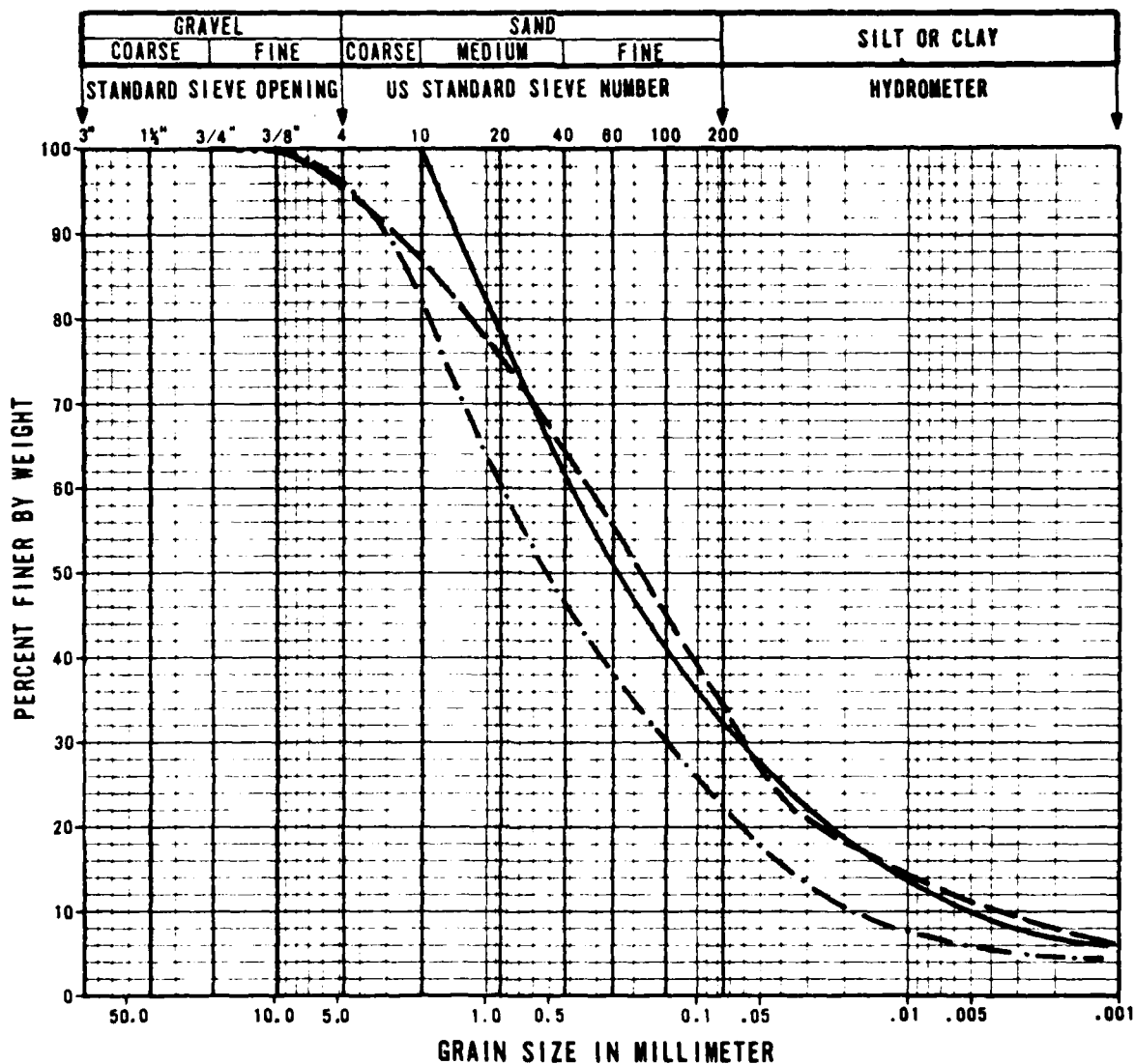
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-A-12	D-5	20.0-20.3	6.10-6.19	32	20	12	SC
- -	LD-A-12	S-7	40.0-41.3	12.19-12.59				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS

FIGURE
C-144

FUGRO NATIONAL, INC.



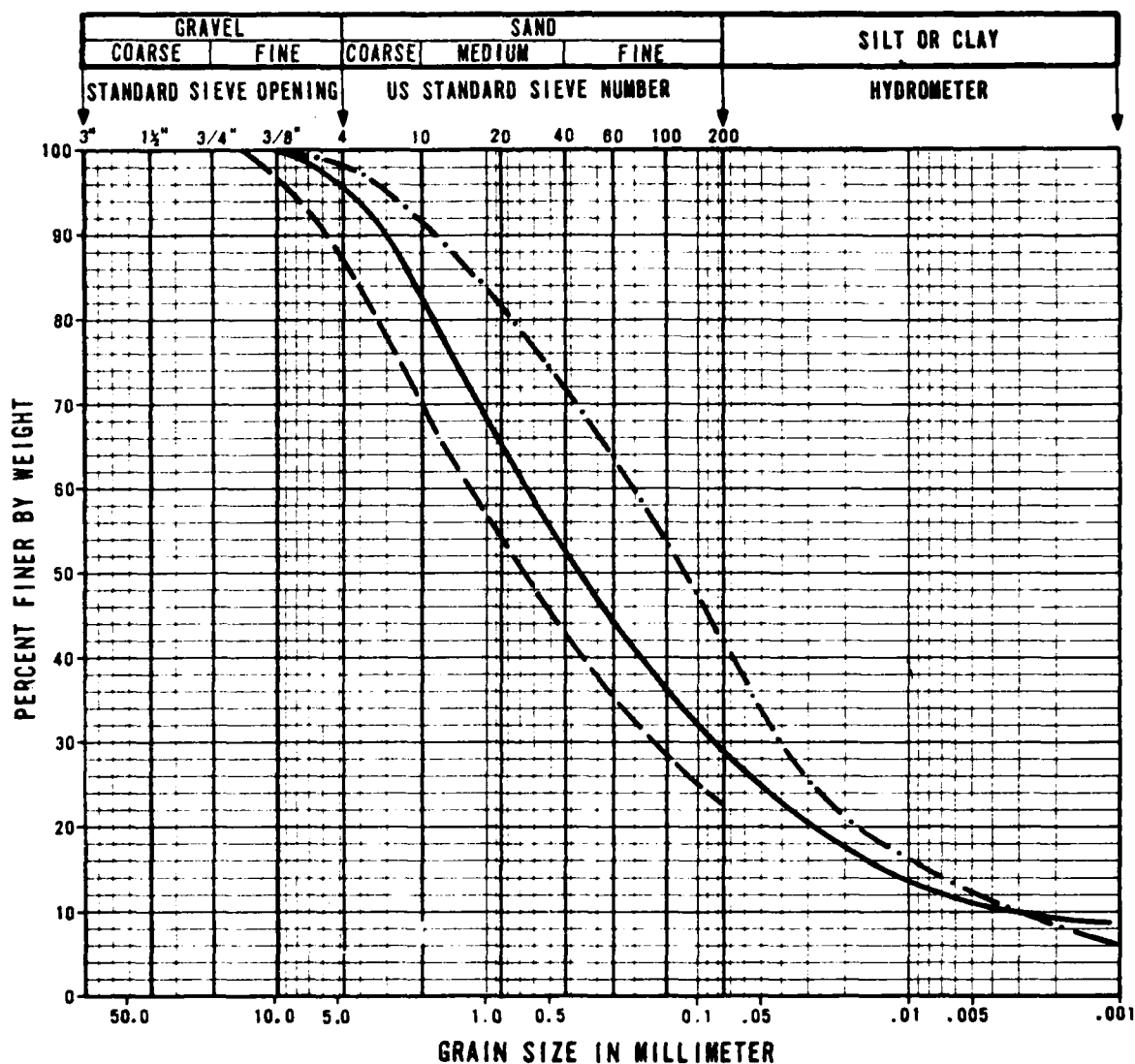
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-1	P-2	10.0-10.6	3.05-3.23	34	21	13	SC
- - -	LD-B-1	P-3	15.0-15.6	4.57-4.75	23	17	6	SC/SM
- · - · -	LD-B-1	P-4	21.2-21.8	6.46-6.64		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-145

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-8-1	P-5	30.0-30.6	9.14-9.33	27	21	6	SC/SM
- - -	LD-8-1	P-7	50.0-50.8	15.24-15.48	38	20	18	SC
- · - ·	LD-8-1	P-10	80.0-80.6	24.38-24.57	27	19	8	SC

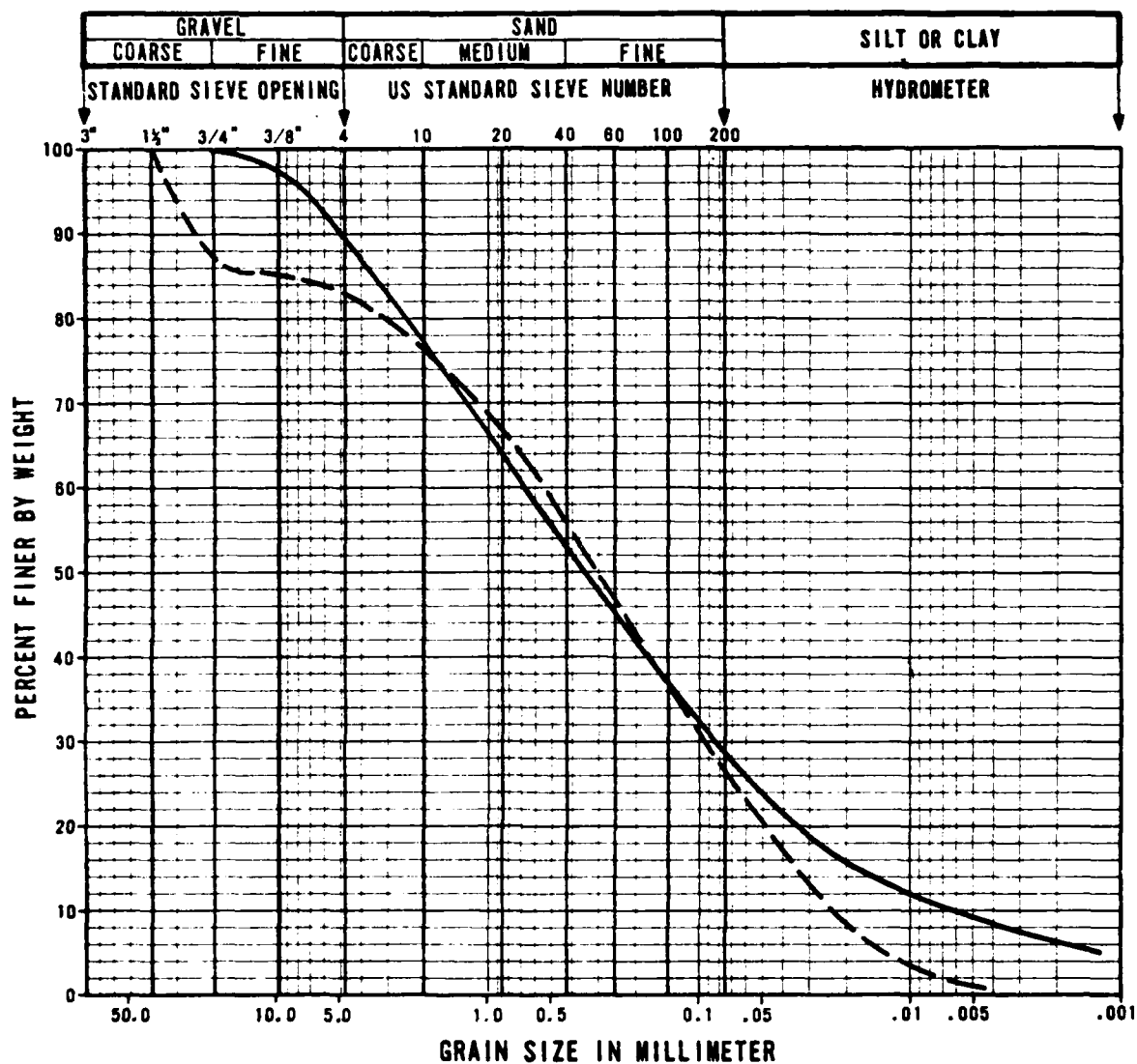
GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MAX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-146

FUGRO NATIONAL, INC.



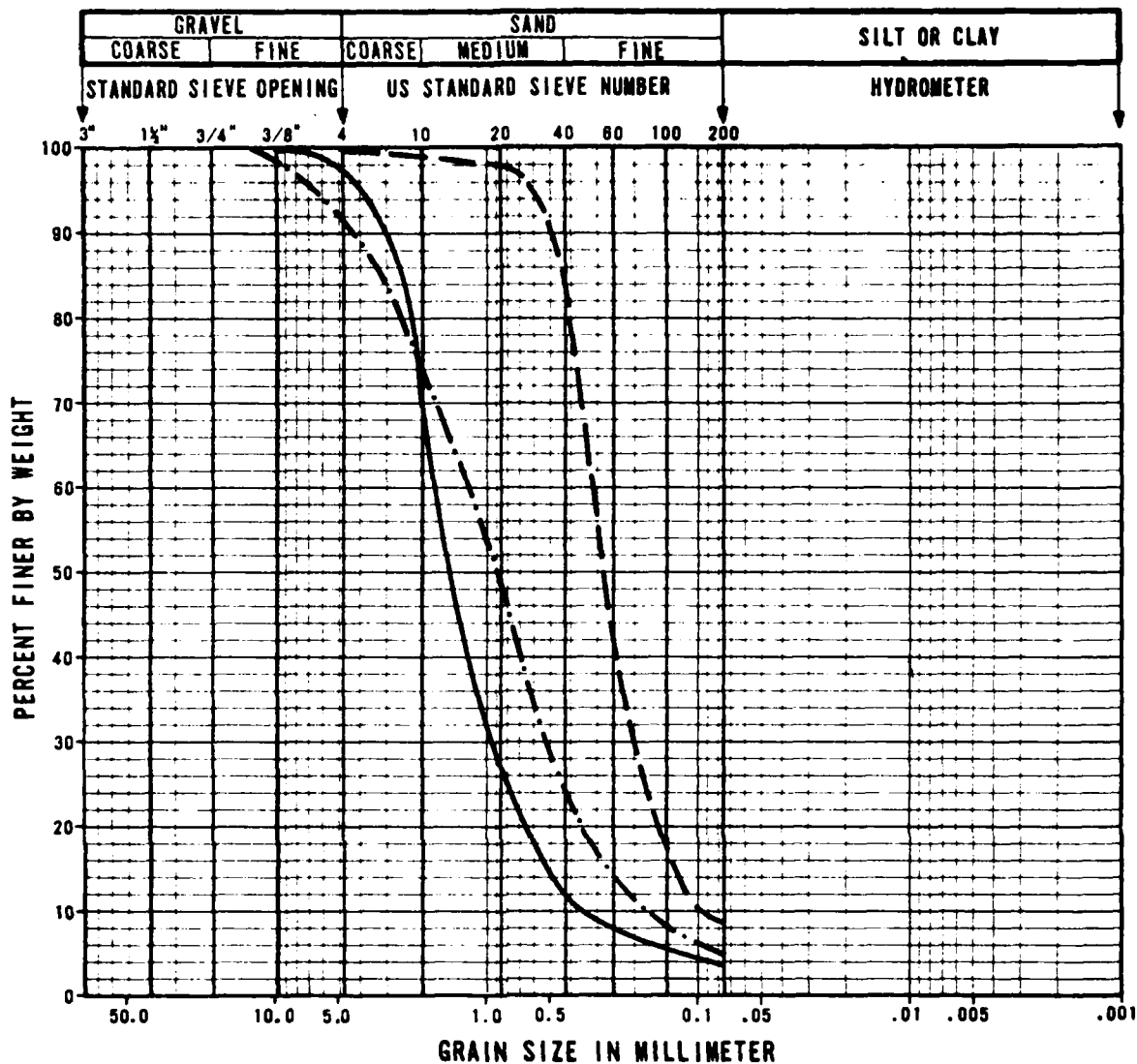
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-1	P-11	90.0-91.1	27.43-27.77	31	23	8	SC
- -	LD-B-1	P-14	125.0-125.1	38.10-38.13				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-147

FUGRO NATIONAL, INC.



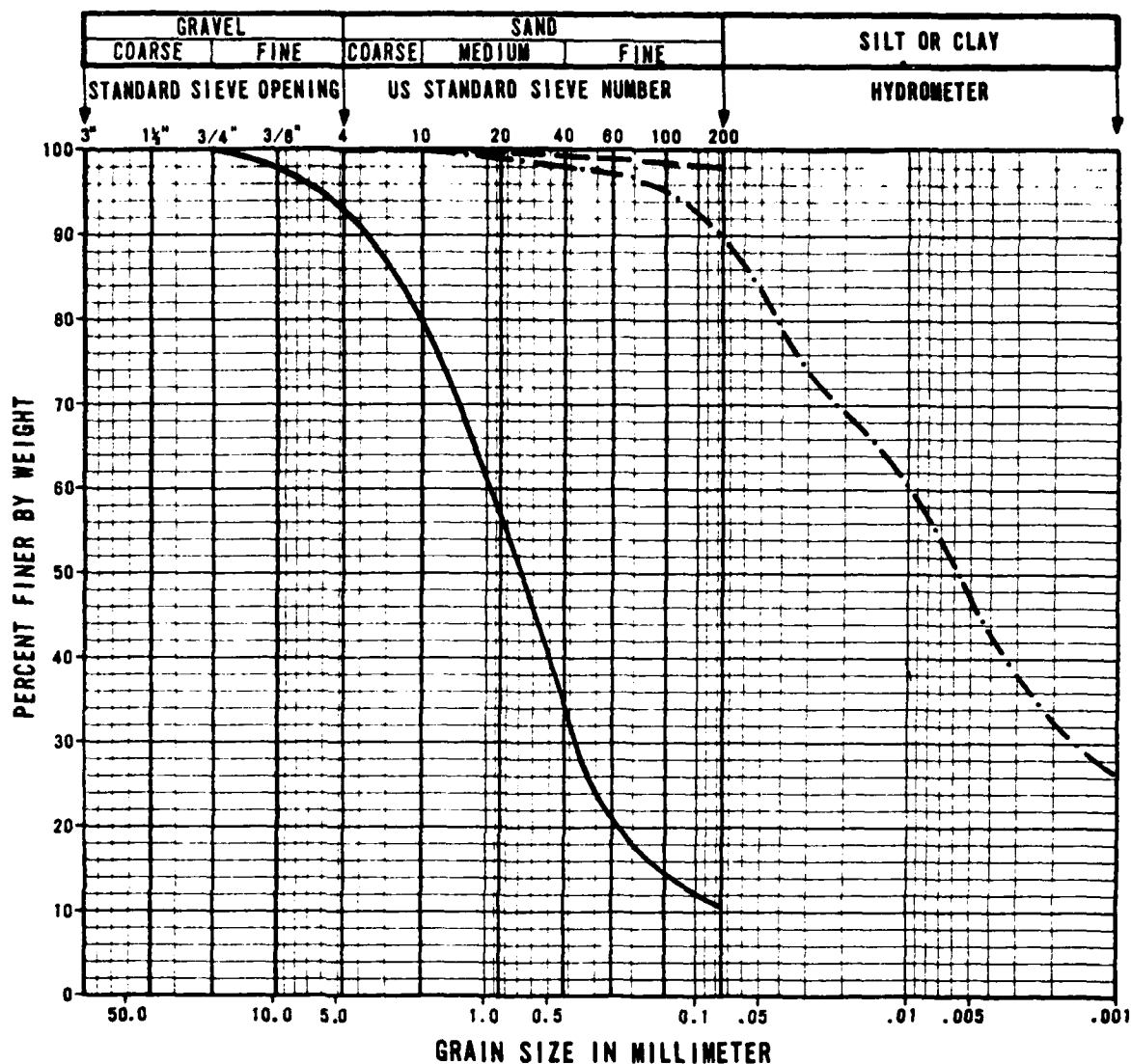
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-2	D-2	5.0-6.5	1.52-1.98				SP
- -	LD-B-2	D-3	10.5-11.0	3.20-3.35				SP/SM
- · -	LD-B-2	S-6	30.0-31.5	9.13-9.60				SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-148

FUGRO NATIONAL, INC.



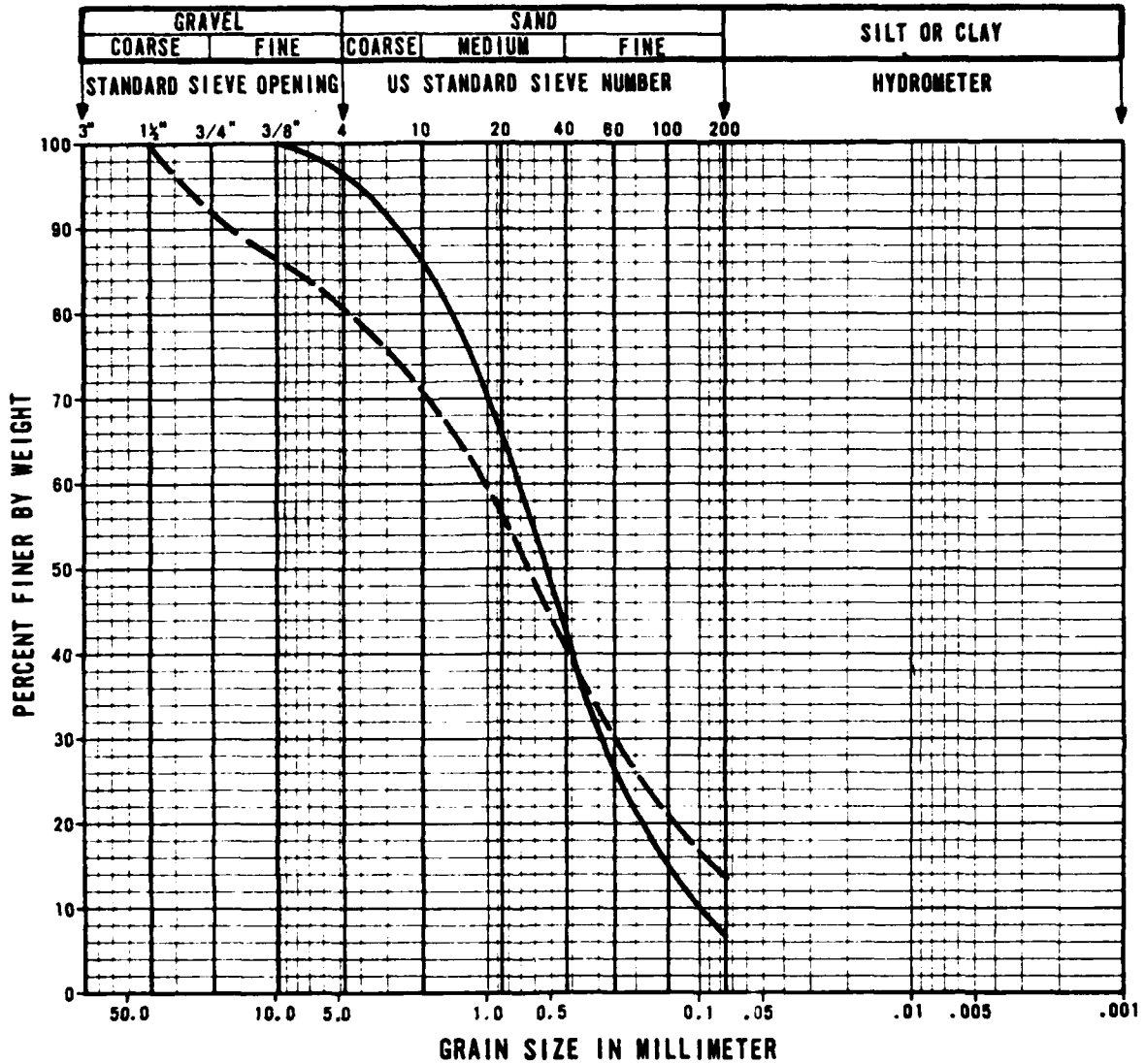
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-2	S-10	70.0-71.5	21.34-21.79				SW/SM
—	LD-B-2	S-12	90.0-91.5	27.43-27.89	38	23	15	CL
—	LD-B-2	S-13	100.0-101.0	30.48-30.78	40	17	23	CL

GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-149

FUGRO NATIONAL, INC.



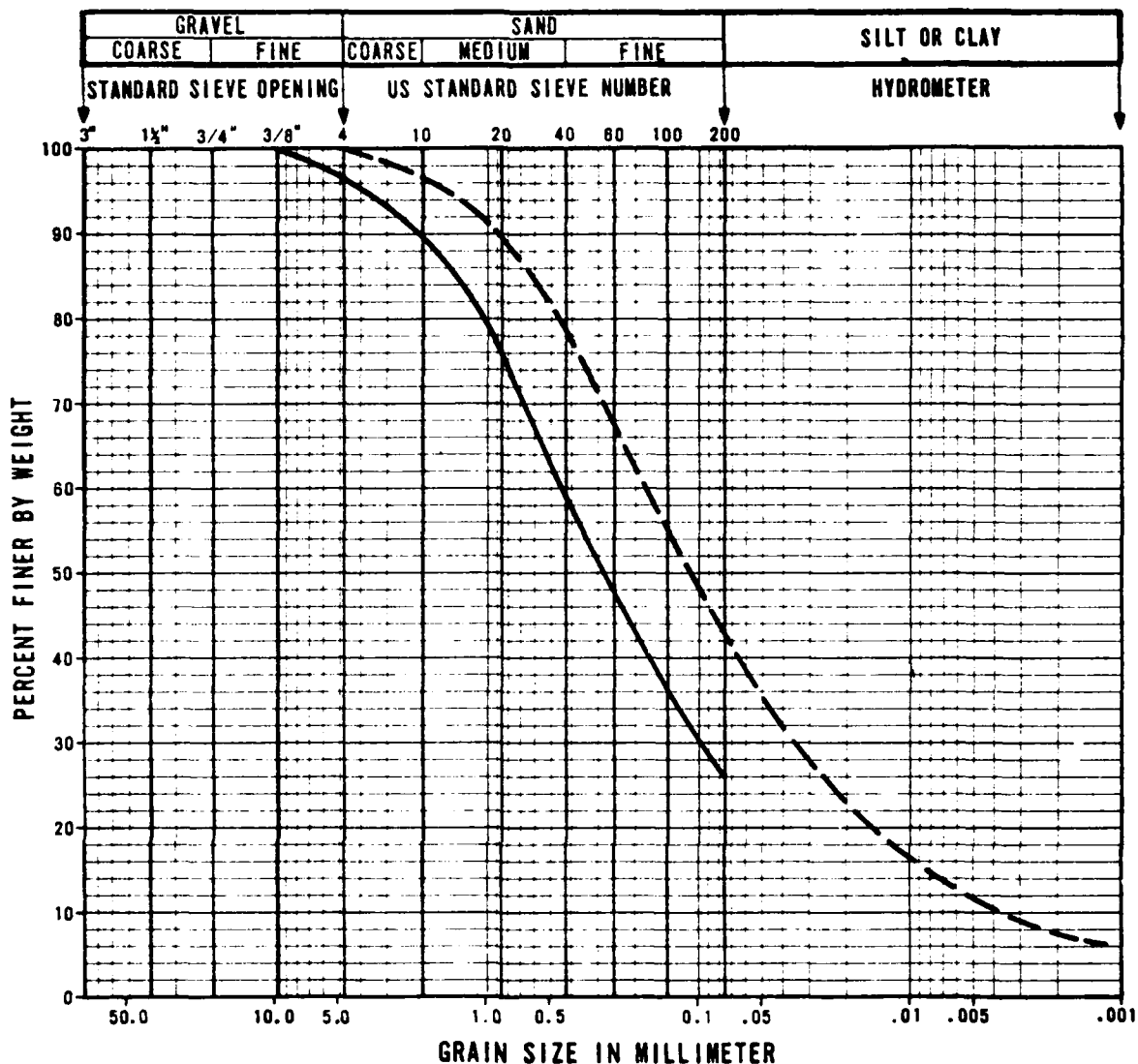
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-3	D-2	5.0-6.0	1.52-1.83				SW/SM
- - -	LD-B-3	S-4	15.0-16.5	4.57-5.03				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-150

FUGRO NATIONAL, INC.



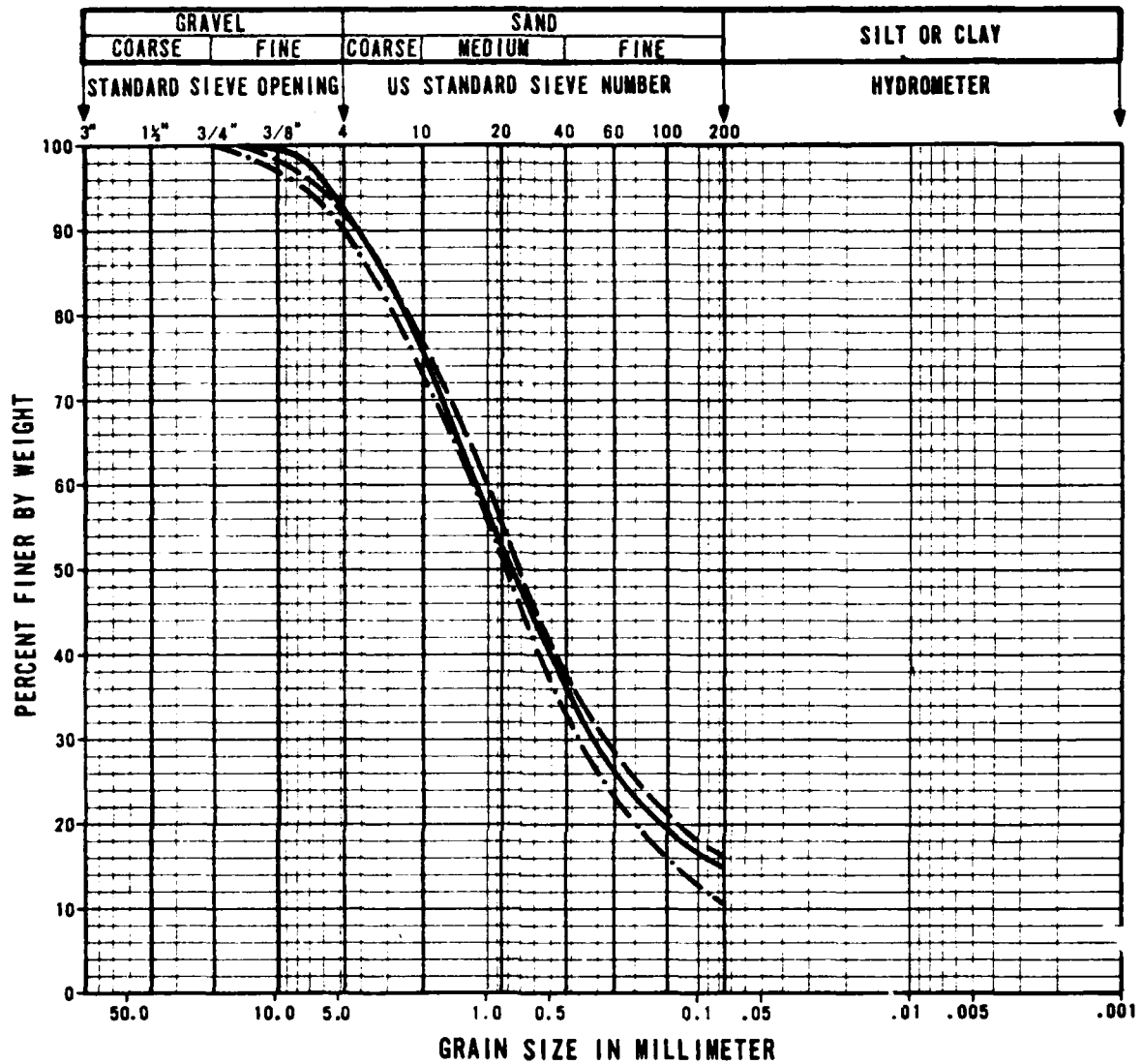
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-3	S-7	40.0-40.4	12.19-12.31				SM
- -	LD-B-3	S-13	60.0-60.2	18.29-18.35				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-151

FUGRO NATIONAL, INC.



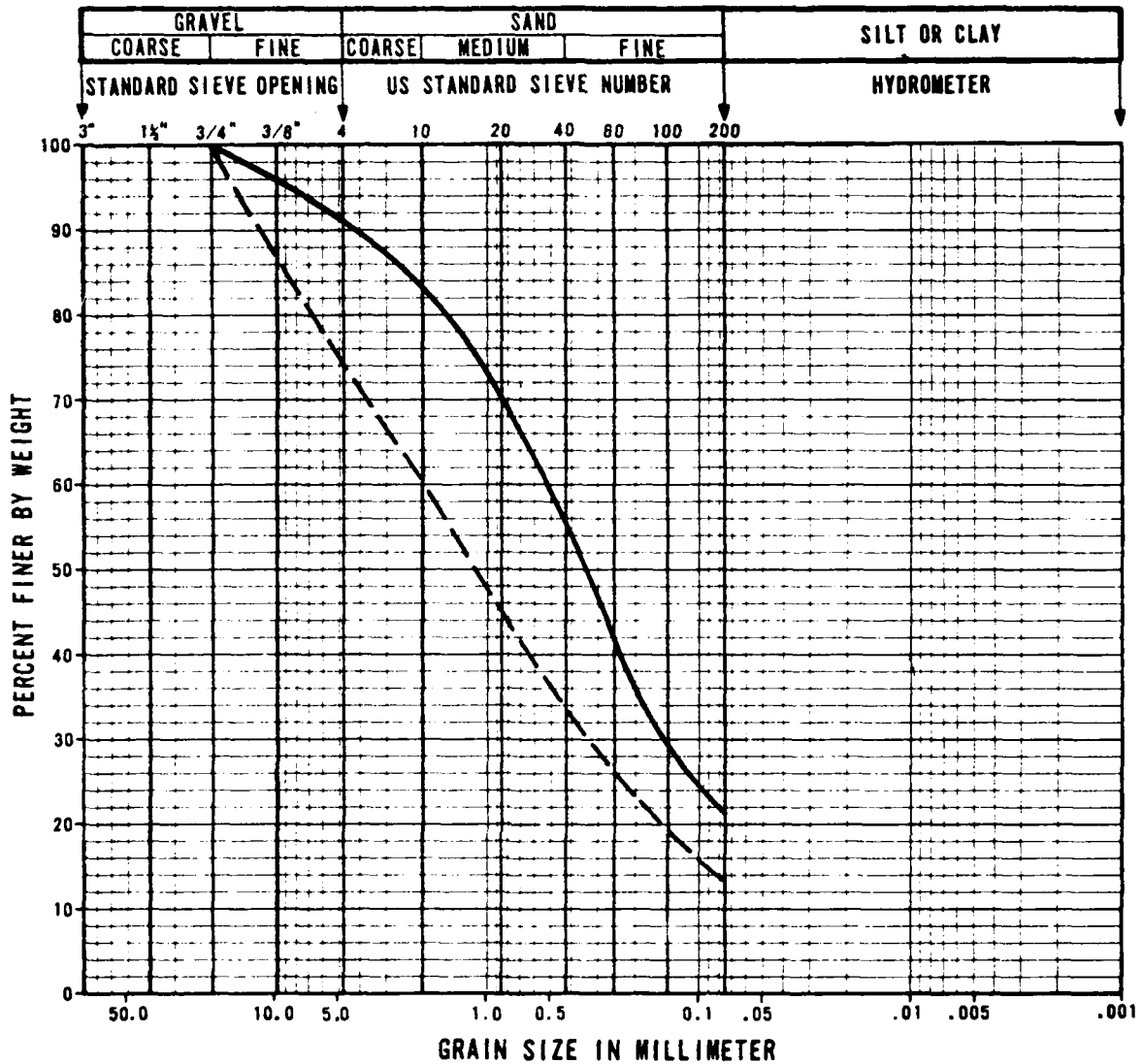
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-4	B-1	0.0-5.0	0.00-1.52				SM
- - -	LD-B-4	B-2	5.0-10.0	1.52-3.05		NP		SM
- · - ·	LD-B-4	S-5	15.0-16.5	4.57-5.03				SW/SW

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-152

FUGRO NATIONAL, INC.



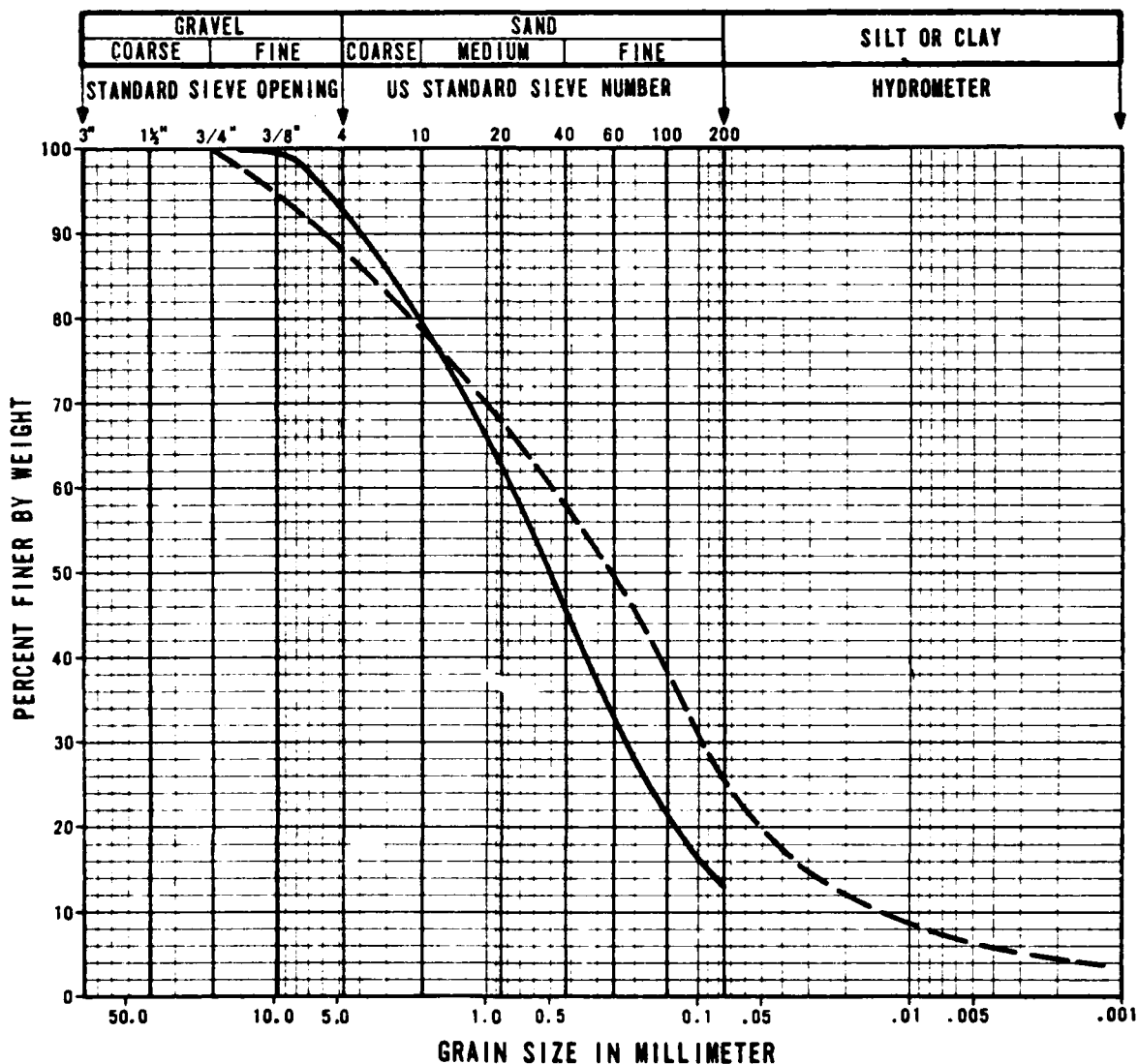
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-4	S-9	30.0-30.2	9.14-9.20				SM
- -	LD-B-4	S-16	100.0-100.3	30.48-30.57				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-153

FUGRO NATIONAL, INC.



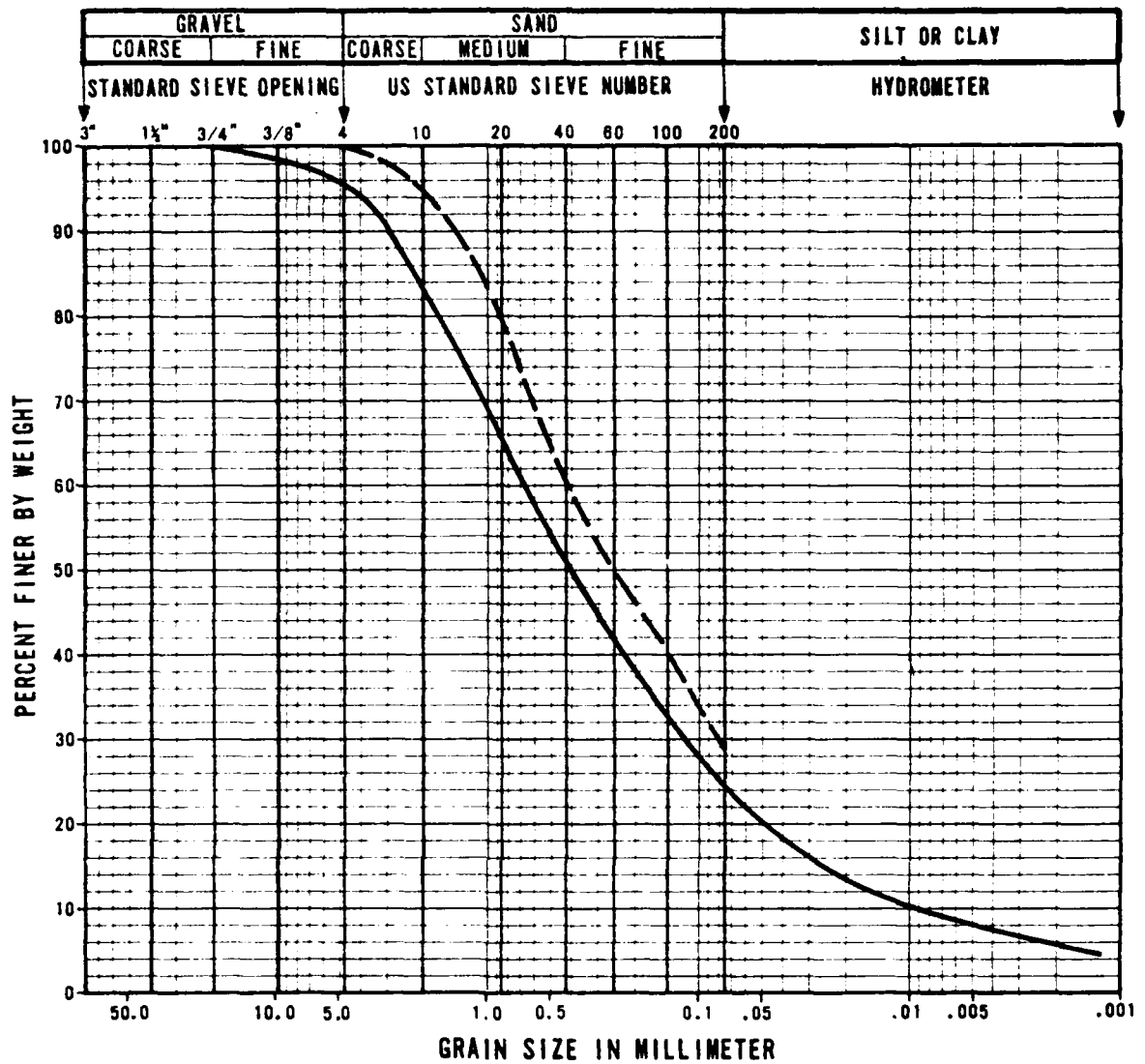
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-5	B-1	0.0-5.0	0.00-1.52		NP		SM
- - -	LD-B-5	B-4	10.0-15.0	3.05-4.57		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-154

FUGRO NATIONAL, INC.



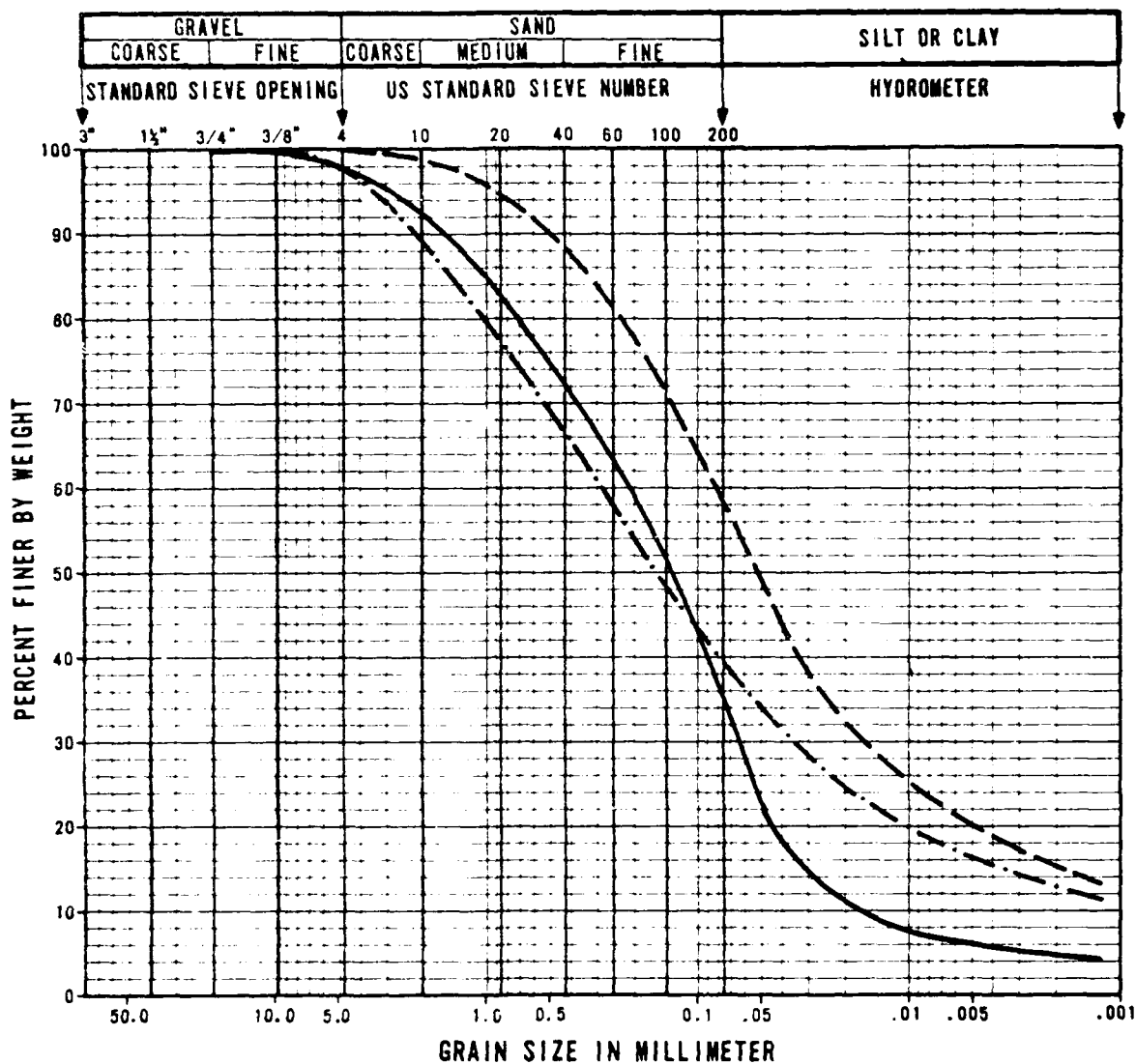
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-5	S-8	40.0-40.2	12.19-12.25				SM
- -	LD-B-5	S-10	75.0-75.3	22.86-22.95				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-155

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-6	B-1	0.0-5.0	0.00-1.52		NP		SM
- -	LD-B-6	S-2	5.0-6.0	1.52-1.83	26	17	9	CL
- · -	LD-B-6	B-4	10.0-15.0	3.05-4.57	46	23	23	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMS

FIGURE
C-156

FUGRO NATIONAL, INC.

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FUGRO NATIONAL INC LONG BEACH CA

F/G 8/13

MX SITING INVESTIGATION. GEOTECHNICAL EVALUATION OF LUKE BOMBIN--ETC(U)

JAN 78

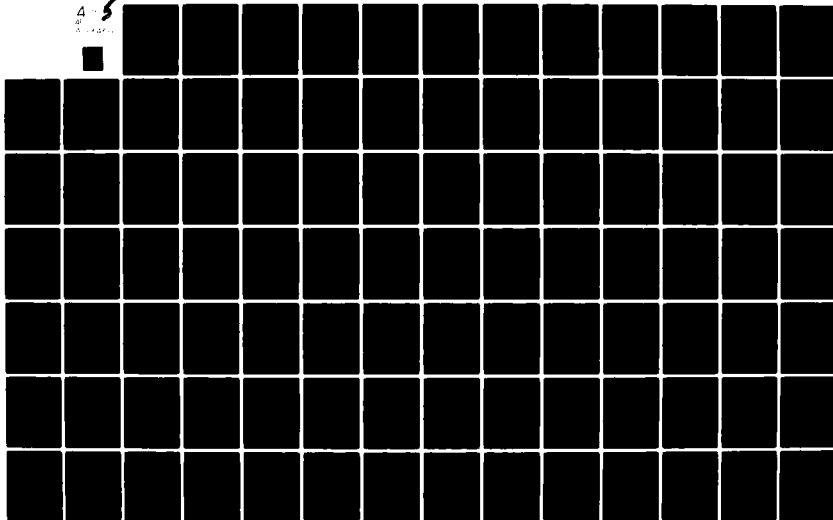
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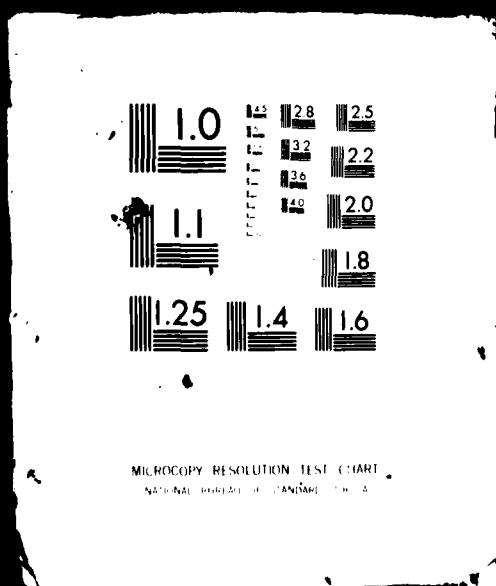


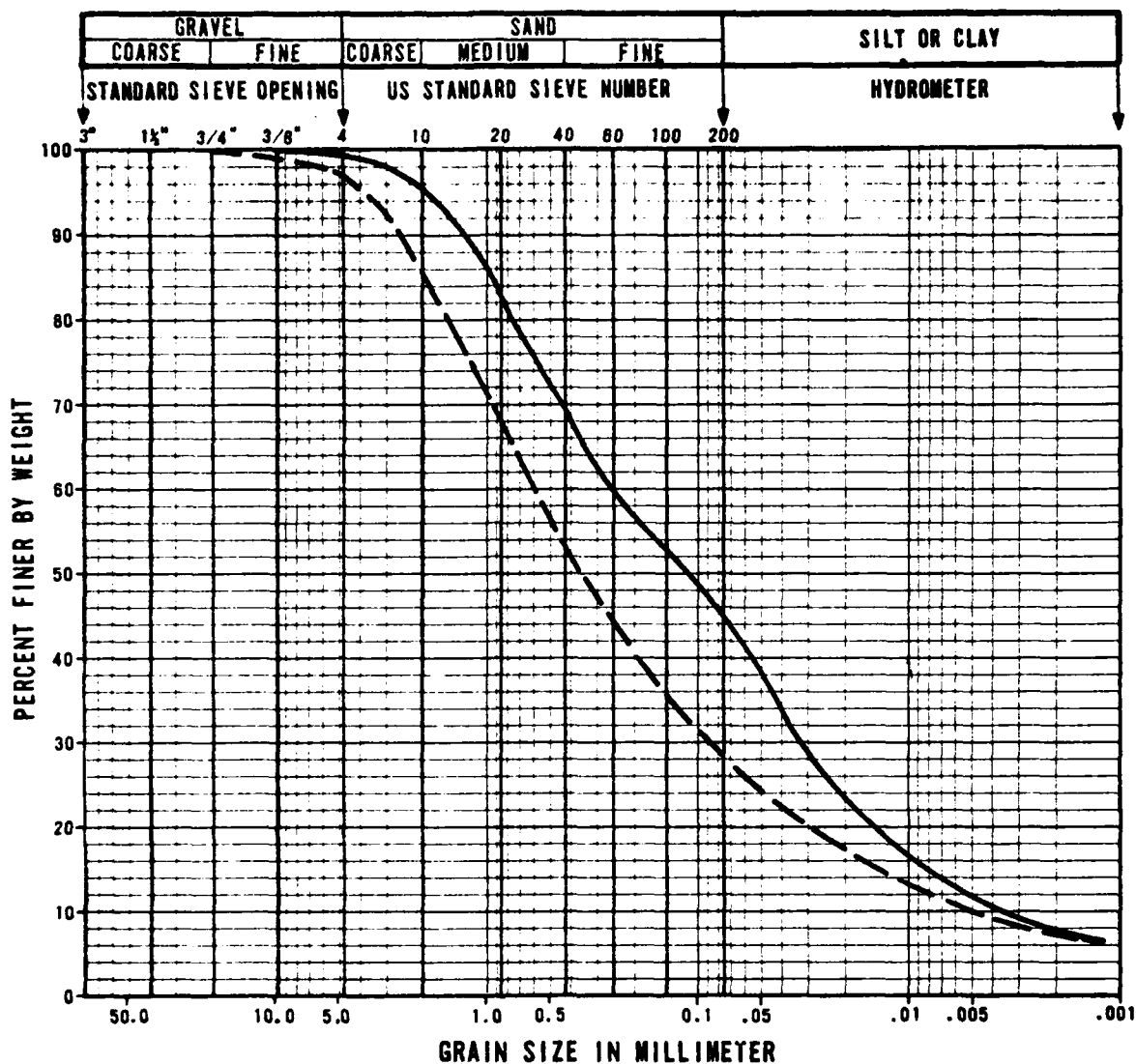
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4 OF 5

AD-

A113450



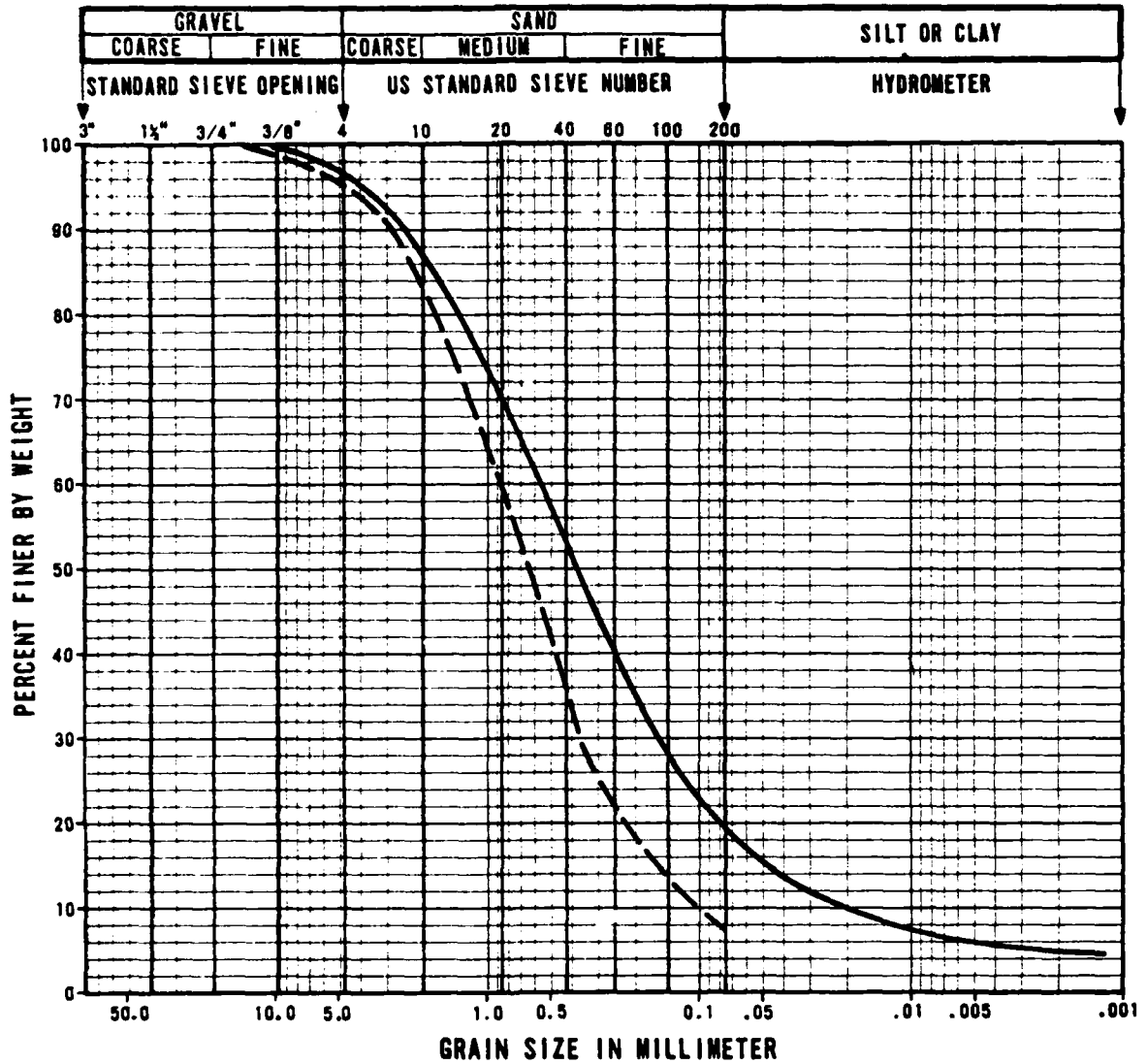


GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-157

FUGRO NATIONAL, INC.



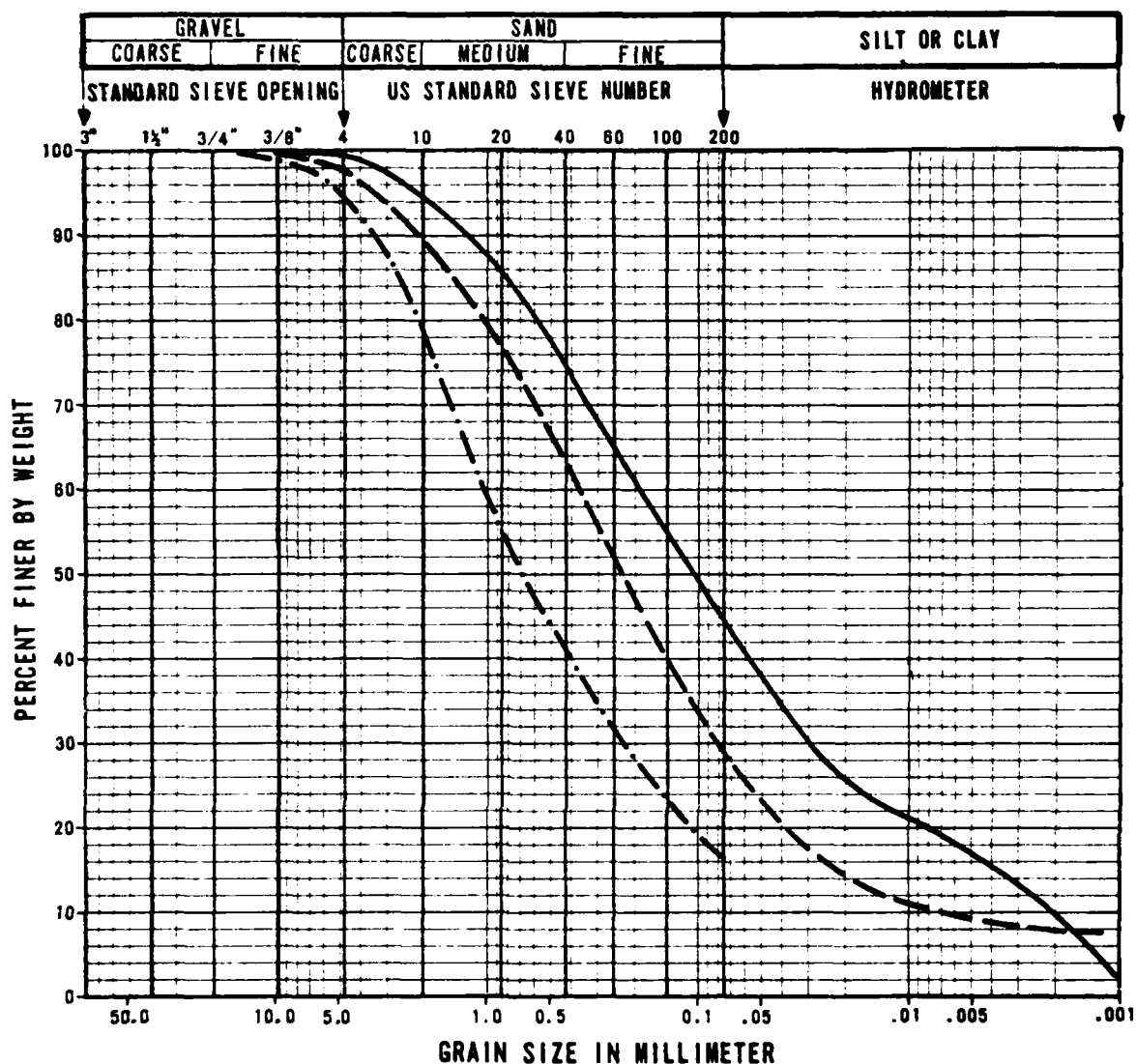
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-8-6	S-11	70.0-71.5	21.34-21.79		NP		SM
- -	LD-8-6	S-13	90.0-91.5	27.43-27.89				SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-158

FUGRO NATIONAL, INC.



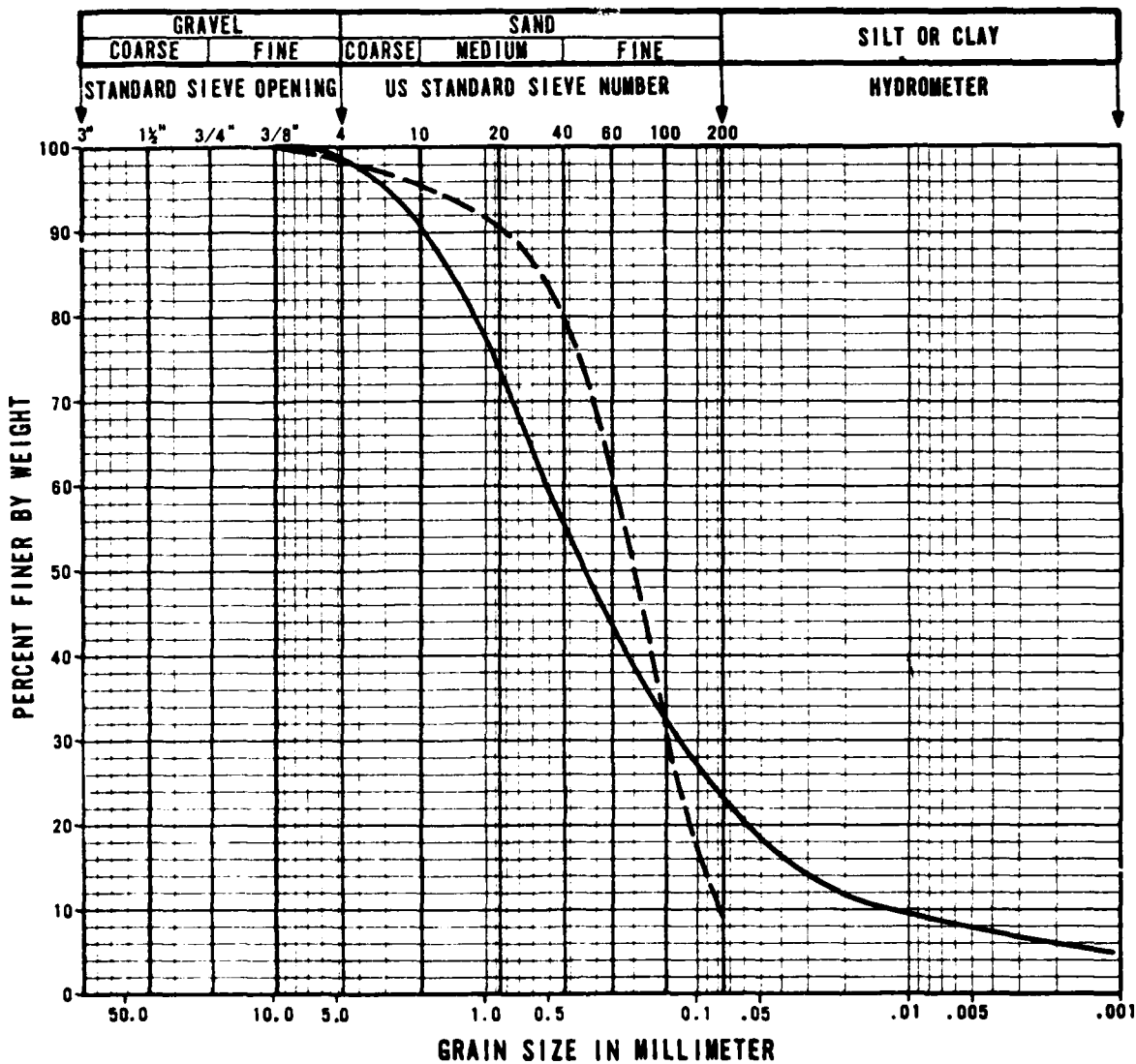
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQU. LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS			
—	LD-B-7	D-1	5.5-6.5	1.68-1.98	30	20	SC
- -	LD-B-7	B-3	10.0-15.0	3.05-4.57	27	22	SC/SM
- · -	LD-B-7	D-5	20.5-21.0	6.25-6.40		NP	SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-159

FUGRO NATIONAL, INC.



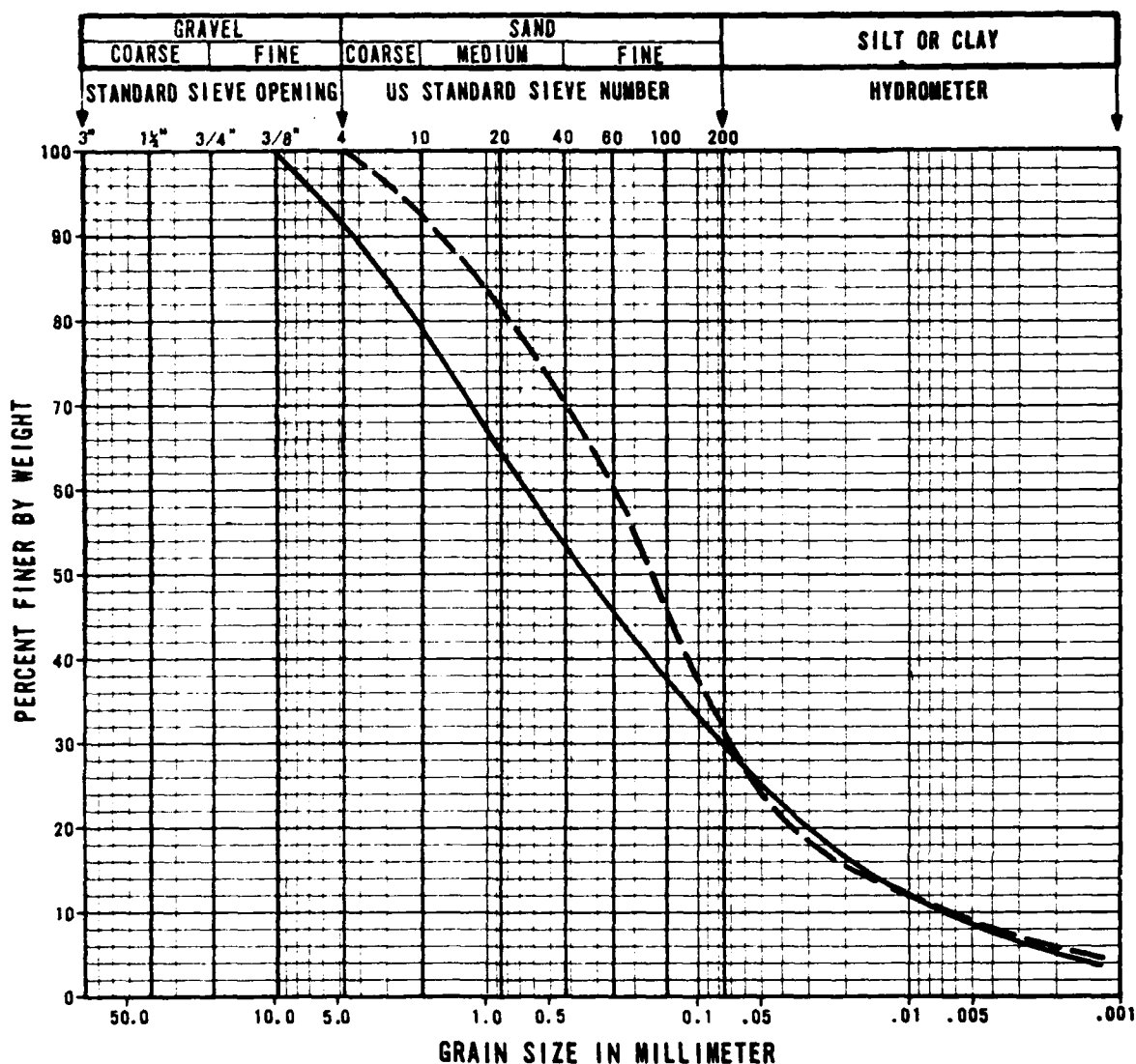
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-8-7	0-9	60.5-61.0	18.44-18.59	33	20	13	SC
- -	LD-8-7	0-11	90.0-90.2	27.43-27.49				SP/SW

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-160

FUGRO NATIONAL, INC.



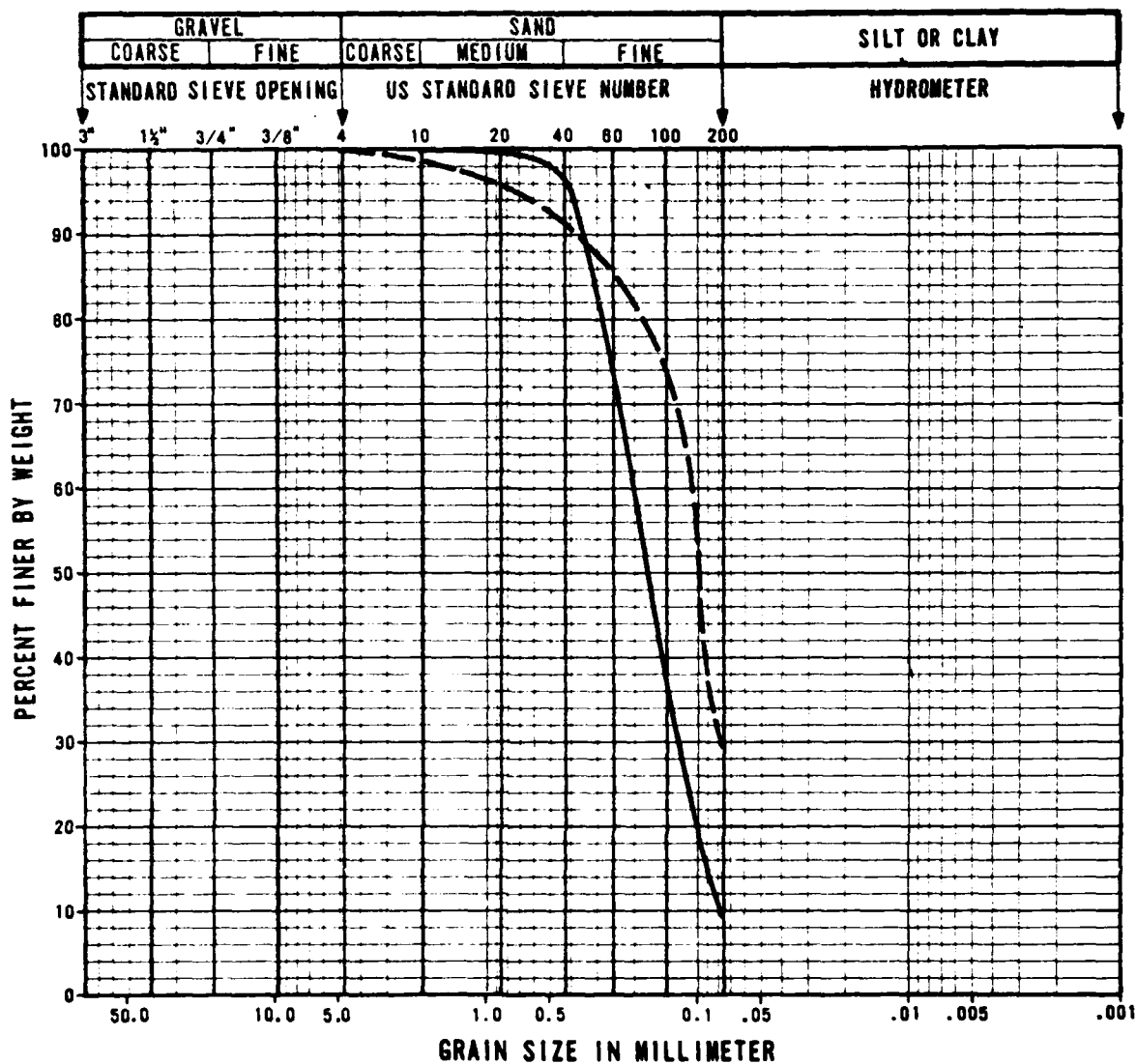
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-8-8	S-1	5.0-6.0	1.52-1.83	36	25	11	SM
- -	LD-8-8	S-5	30.0-30.5	9.14-9.30	31	23	8	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-161

FUGRO NATIONAL, INC.



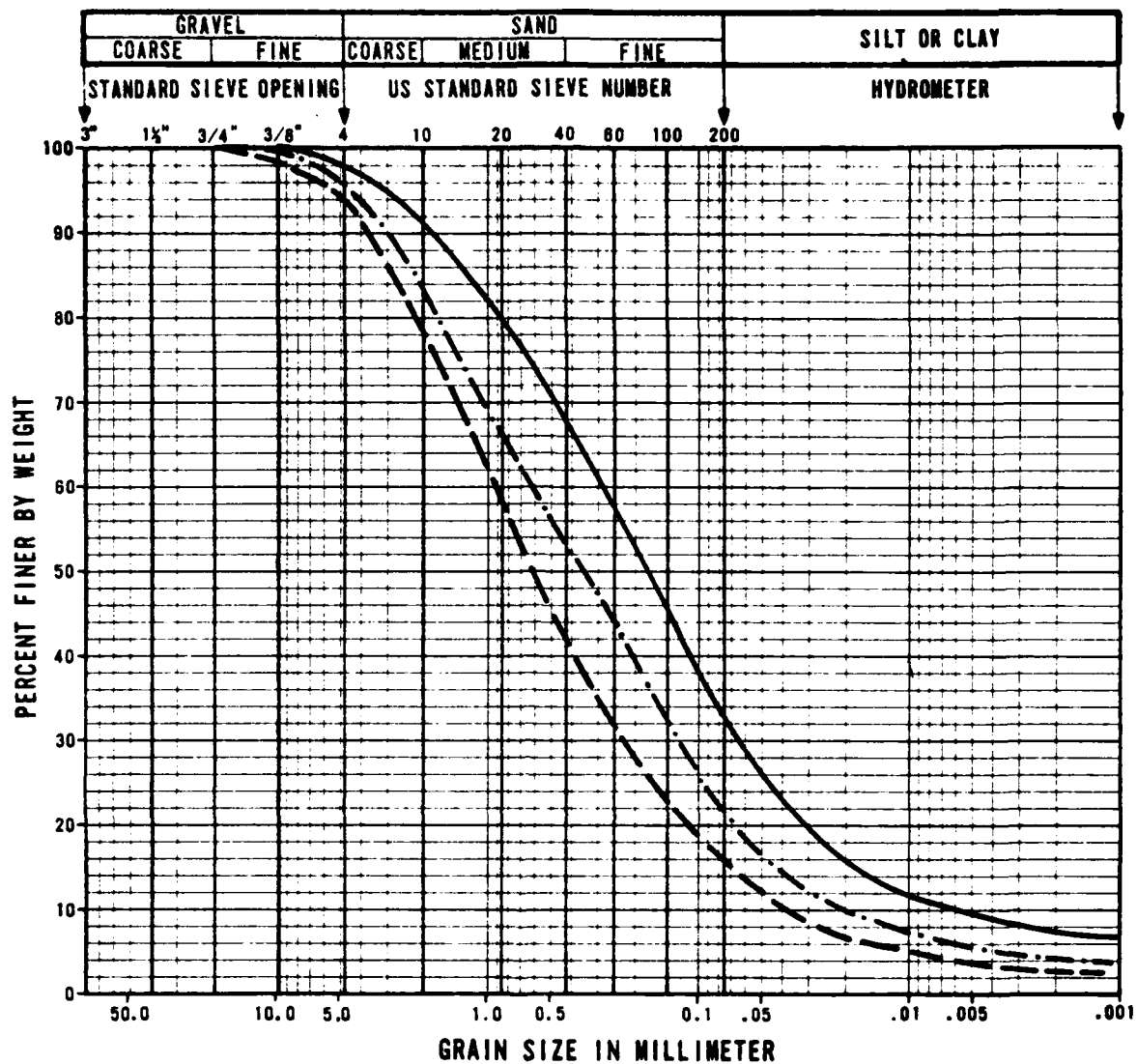
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-8	S-11	90.0-91.3	27.43-27.83				SP/SM
- - -	LD-B-8	S-12	100.0-101.3	30.48-30.94		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-162

FUGRO NATIONAL, INC.



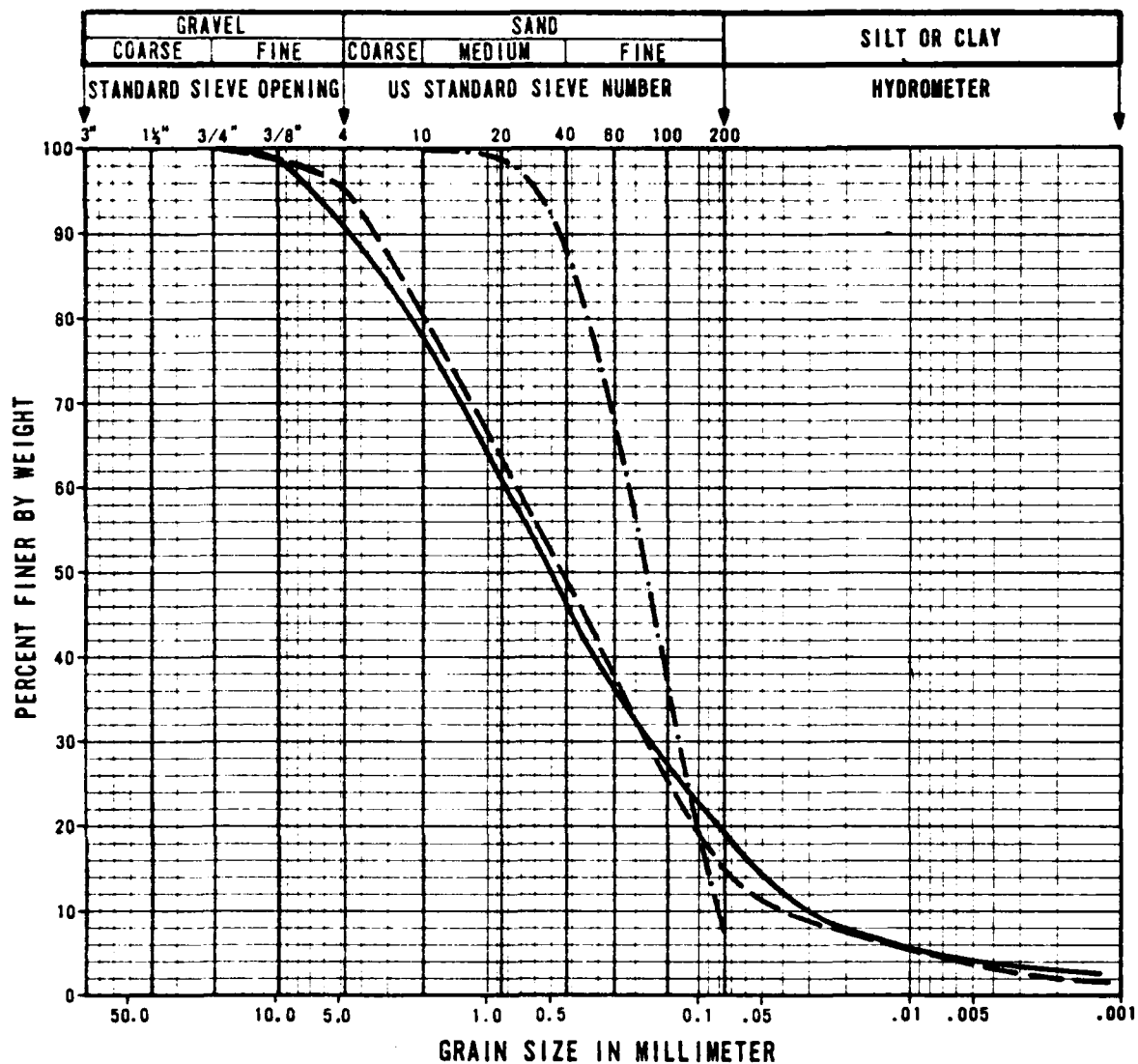
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-9	D-3	15.5-16.0	4.72-4.88	23	19	4	SC/SM
- - -	LD-B-9	D-4	20.5-21.0	6.25-6.40		NP		SM
- · -	LD-B-9	D-6	40.5-41.0	12.34-12.50	25	20	5	SC/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-163

FUGRO NATIONAL, INC.



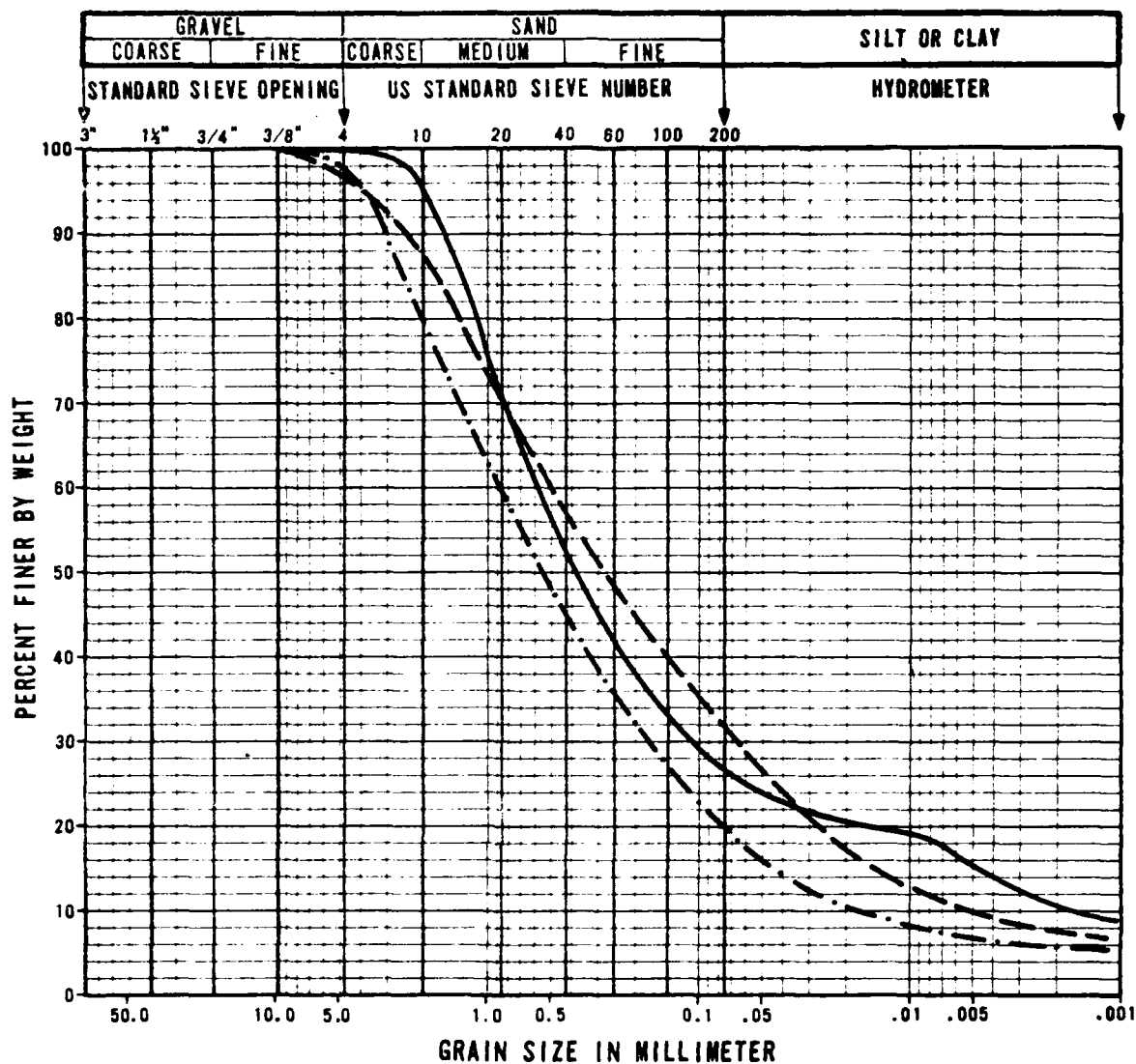
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-8-9	D-7	50.5-51.0	15.39-15.55		NP		SM
---	LD-8-9	D-9	70.5-71.0	21.49-21.64		NP		SM
- - -	LD-8-9	D-11	90.5-91.0	27.58-27.74				SP/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-164

UGRO NATIONAL, INC.



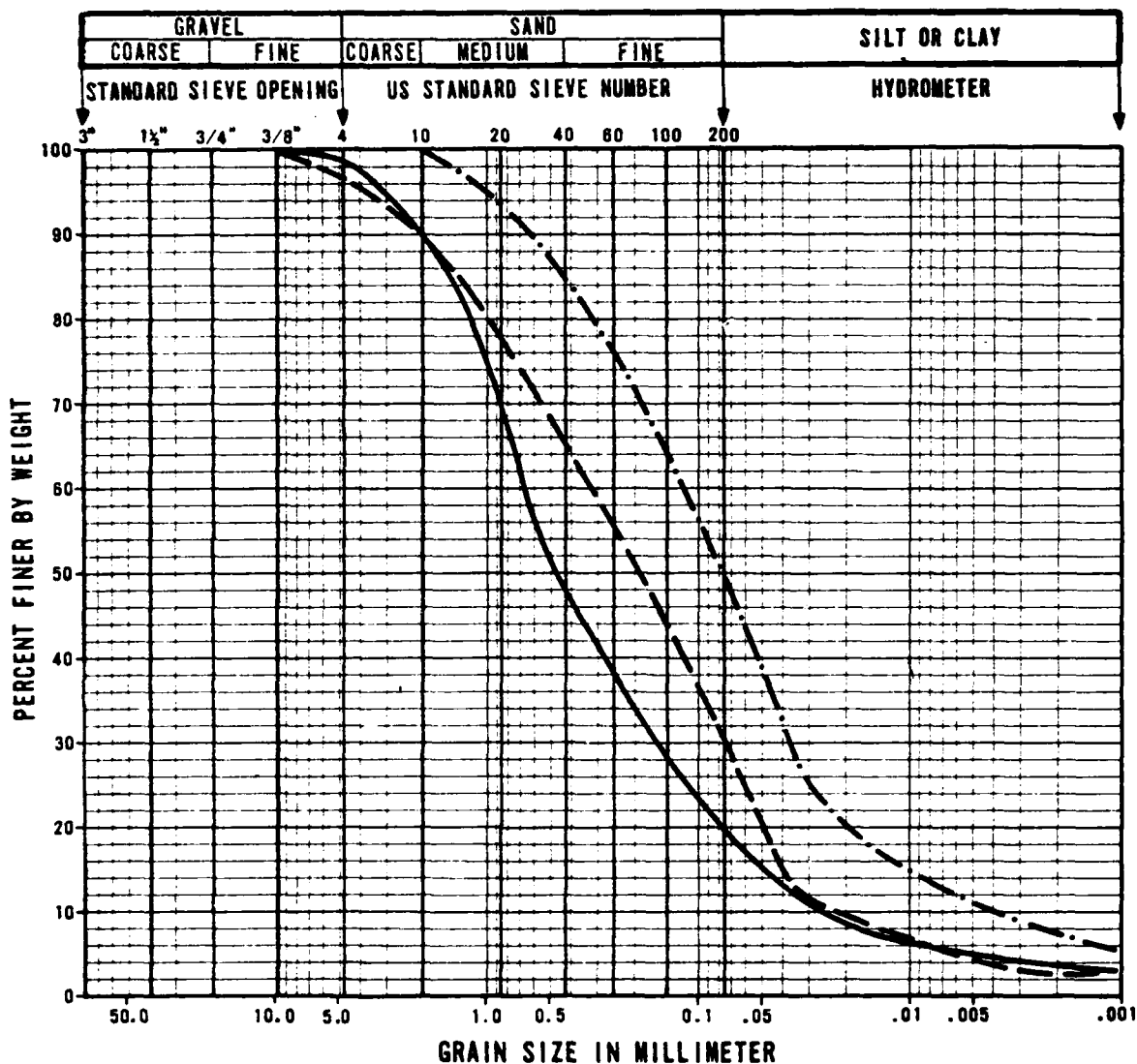
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-10	D-1	5.2-5.7	1.58-1.74	32	17	15	SC
- - -	LD-B-10	B-3	10.0-15.0	3.05-4.57	36	21	15	SC
- · -	LD-B-10	D-4	15.5-16.0	4.72-4.88	35	22	13	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-165

FUGRO NATIONAL, INC.



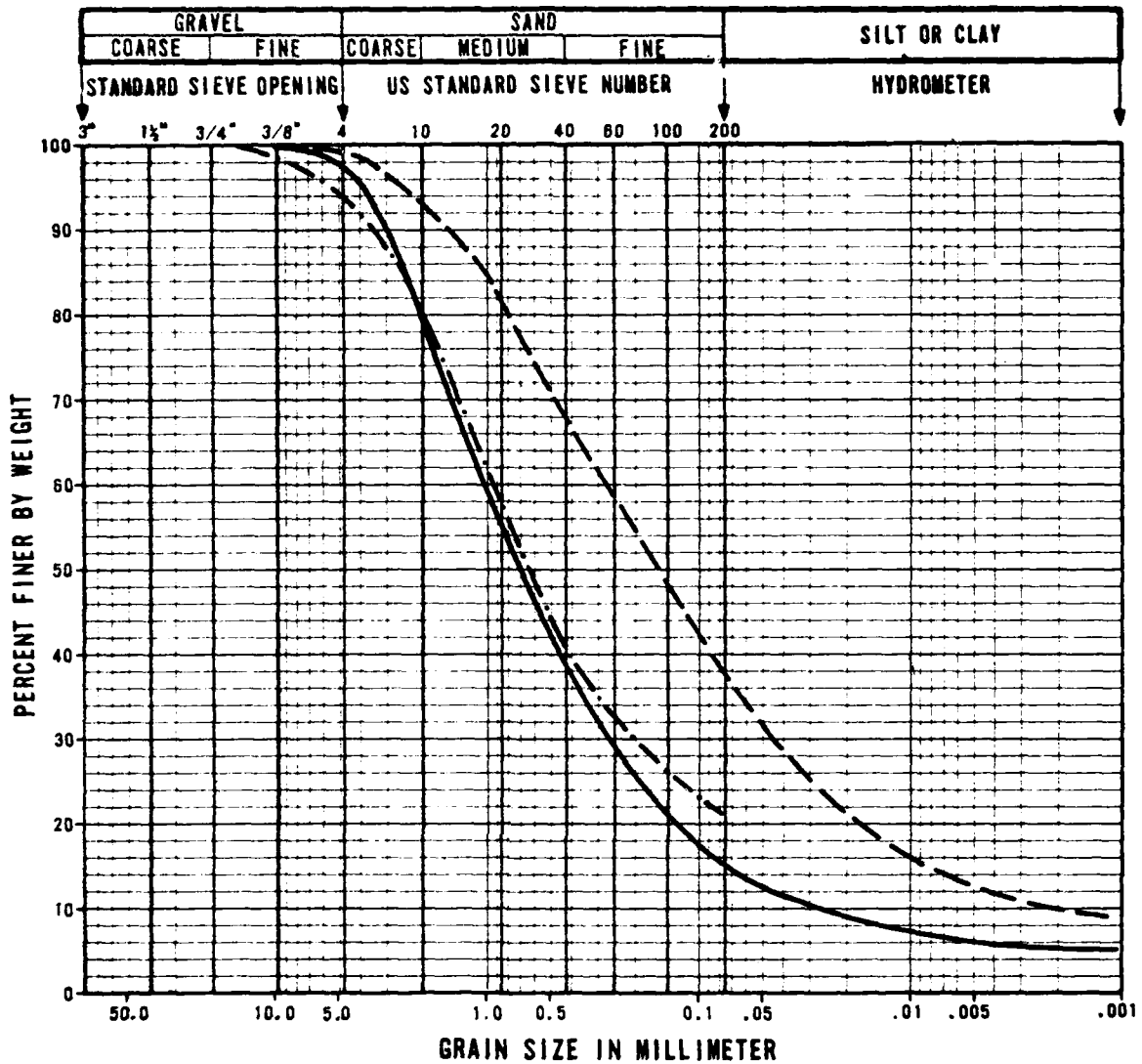
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-8-10	D-8	50.5-51.0	15.39-15.54		NP		SM
- - -	LD-8-10	D-9	60.5-61.0	18.44-18.59	35	20	15	SC
- · -	LD-8-10	D-11	80.5-81.0	24.54-24.69	26	19	7	ML/CL

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-166

FUGRO NATIONAL, INC.



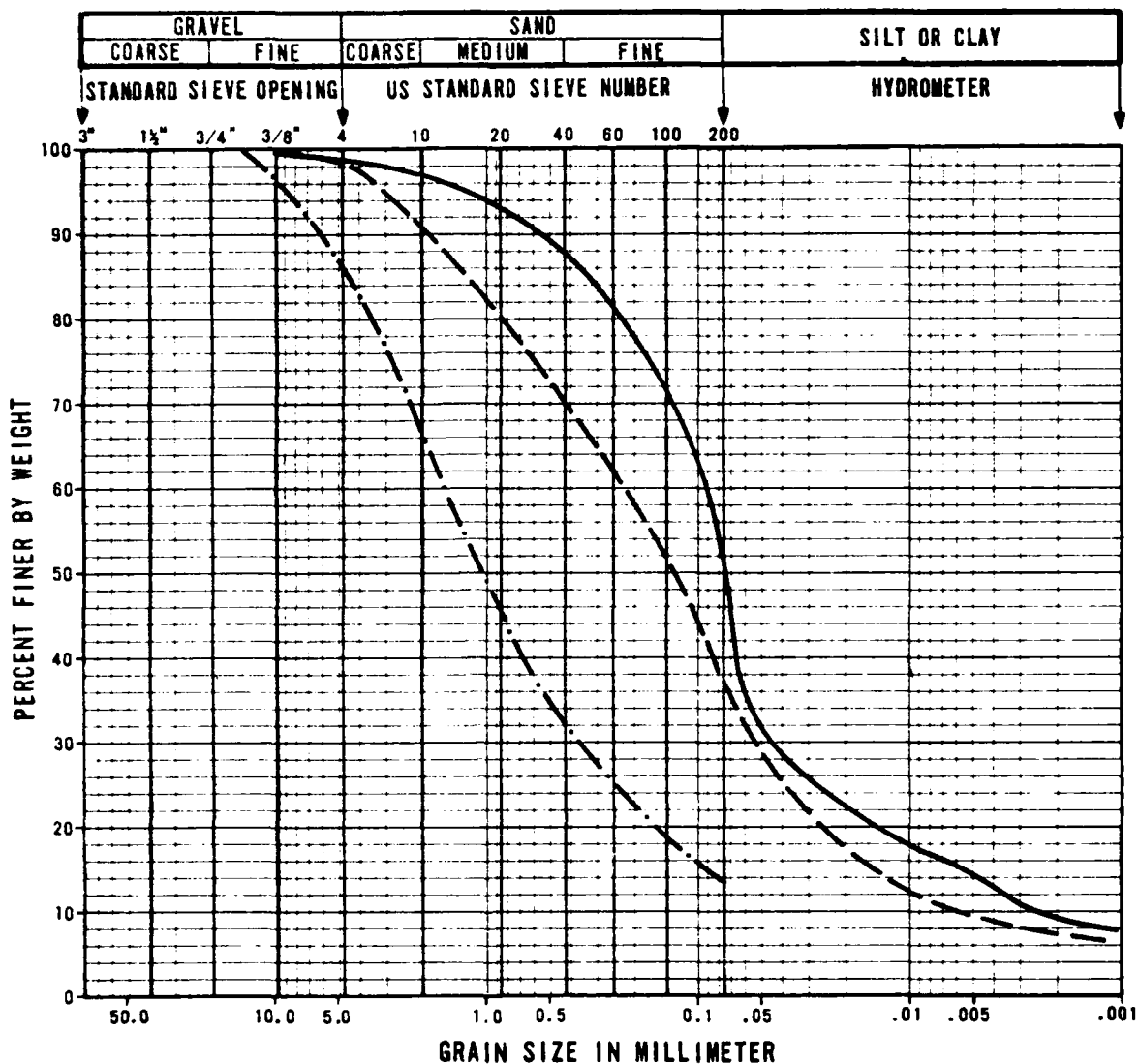
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-11	D-1	5.5-6.0	1.68-1.83	24	18	6	SM/SC
- - -	LD-B-11	D-2	10.5-11.0	3.20-3.35	38	18	20	SC
- · - ·	LD-B-11	B-5	20.0-25.0	6.10-7.62	40	22	18	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-167

FUGRO NATIONAL, INC.



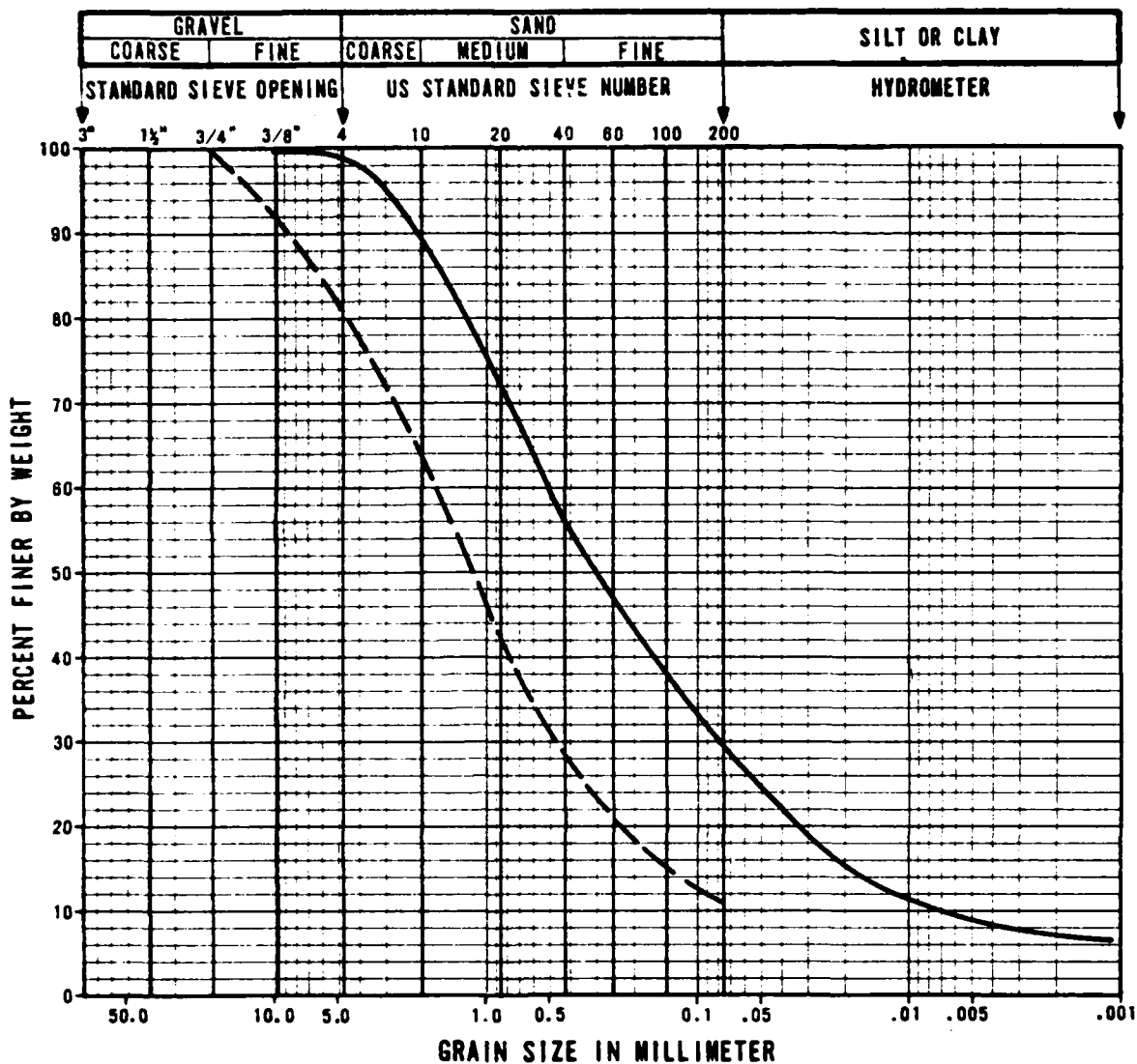
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-11	D-6	30.5-31.0	9.30-9.45	31	24	7	SM/ML
- -	LD-B-11	D-7	40.5-41.0	12.34-12.50	32	19	13	SC
- · -	LD-B-11	D-10	70.5-71.0	21.49-21.64		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-168

FUGRO NATIONAL, INC.



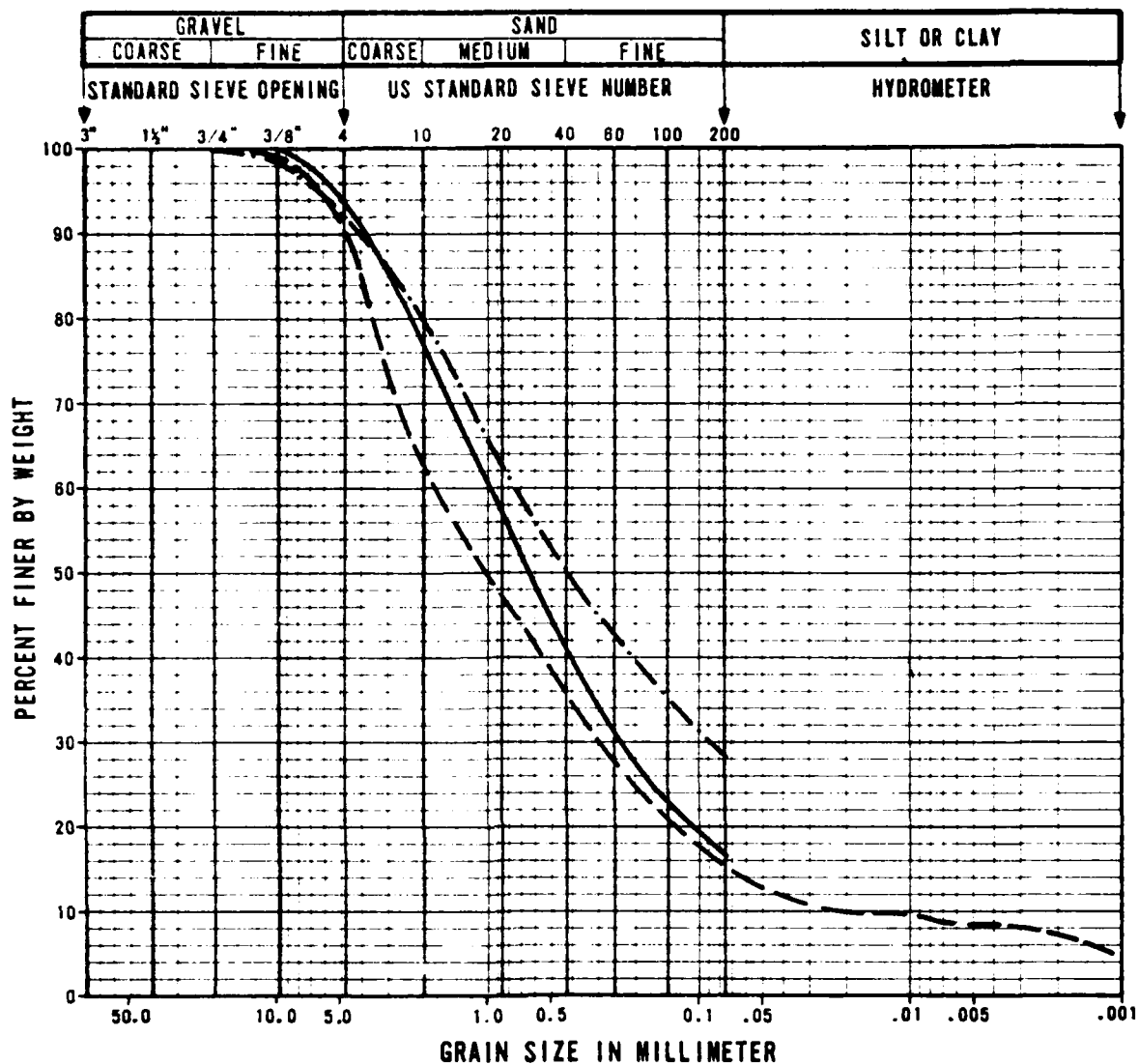
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-11	D-11	80.5-81.0	24.54-24.69	37	20	17	SC
- - -	LD-B-11	D-13	100.5-101.0	30.63-30.78	32	19	13	SW/SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-169

FUGRO NATIONAL, INC.



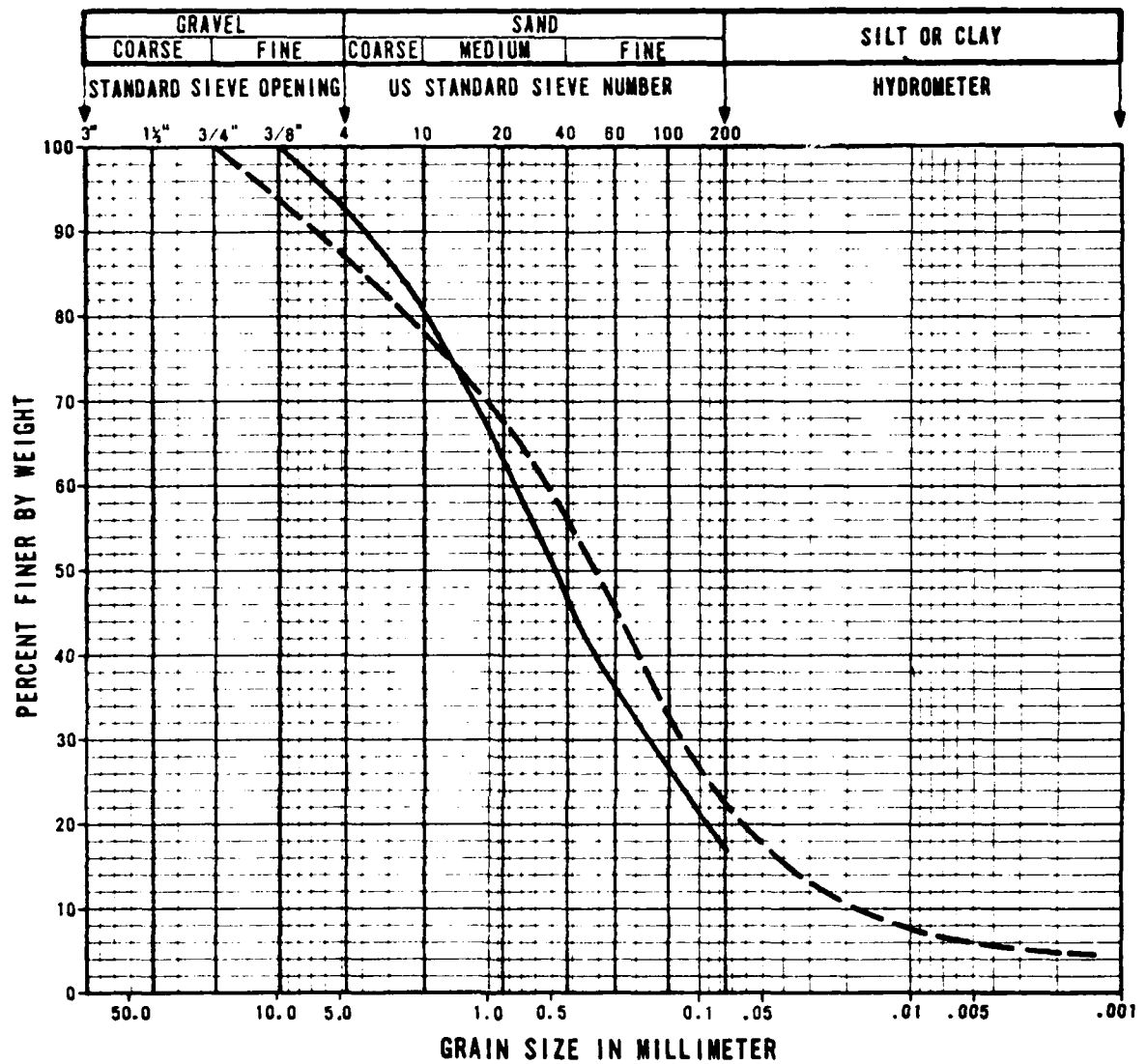
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-12	B-2	0.0-8.5	0.00-2.59	25	20	5	SC/SM
- - -	LD-B-12	D-3	10.5-11.0	3.20-3.35	25	16	9	SC
- · -	LD-B-12	D-4	15.3-15.8	4.66-4.82	32	21	11	SC

GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-170

FUGRO NATIONAL, INC.



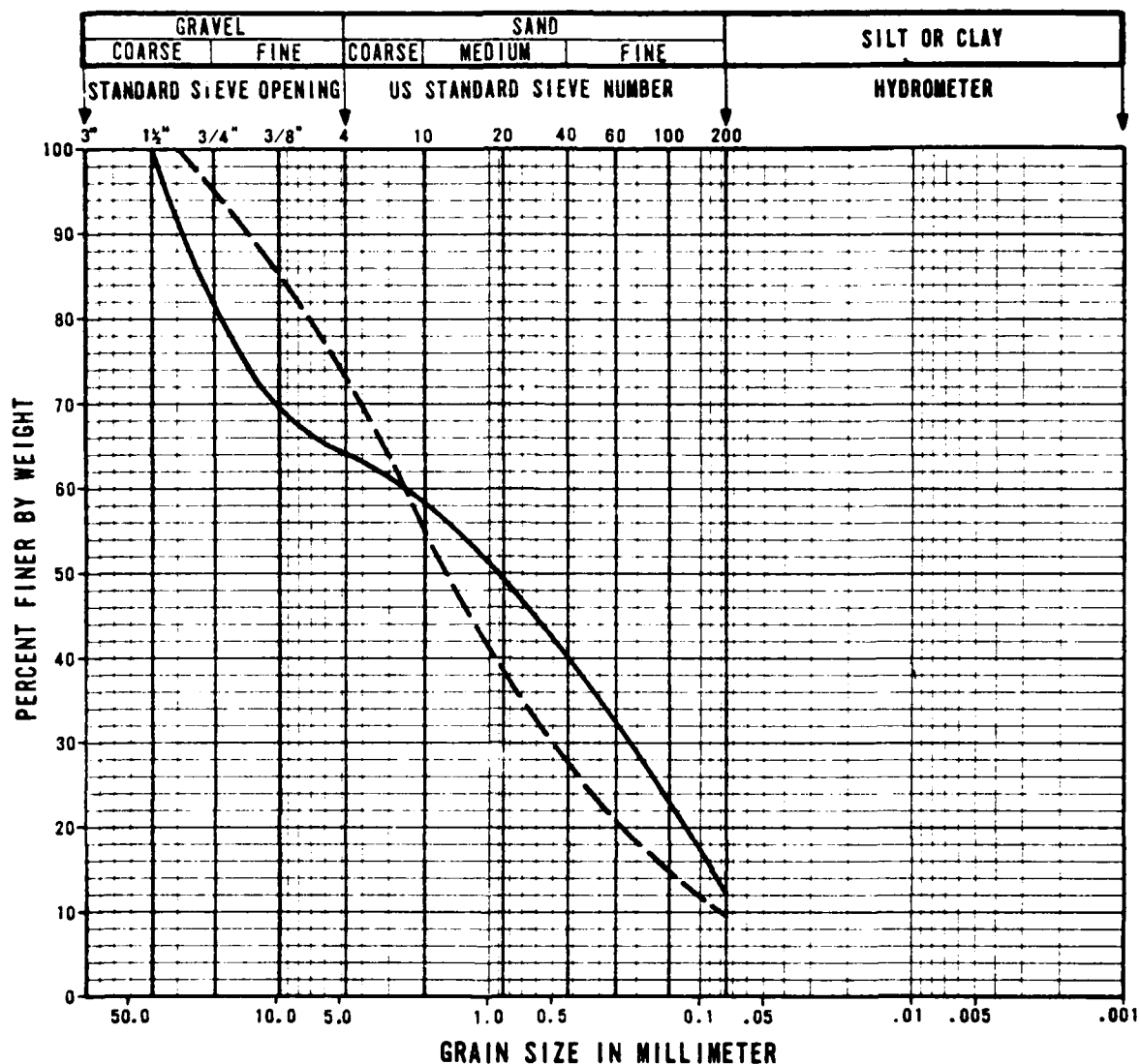
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-12	S-6	30.5-30.9	9.30-9.42				SM
- - -	LD-B-12	S-10	70.0-70.8	21.34-21.58		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-171

FUGRO NATIONAL, INC.



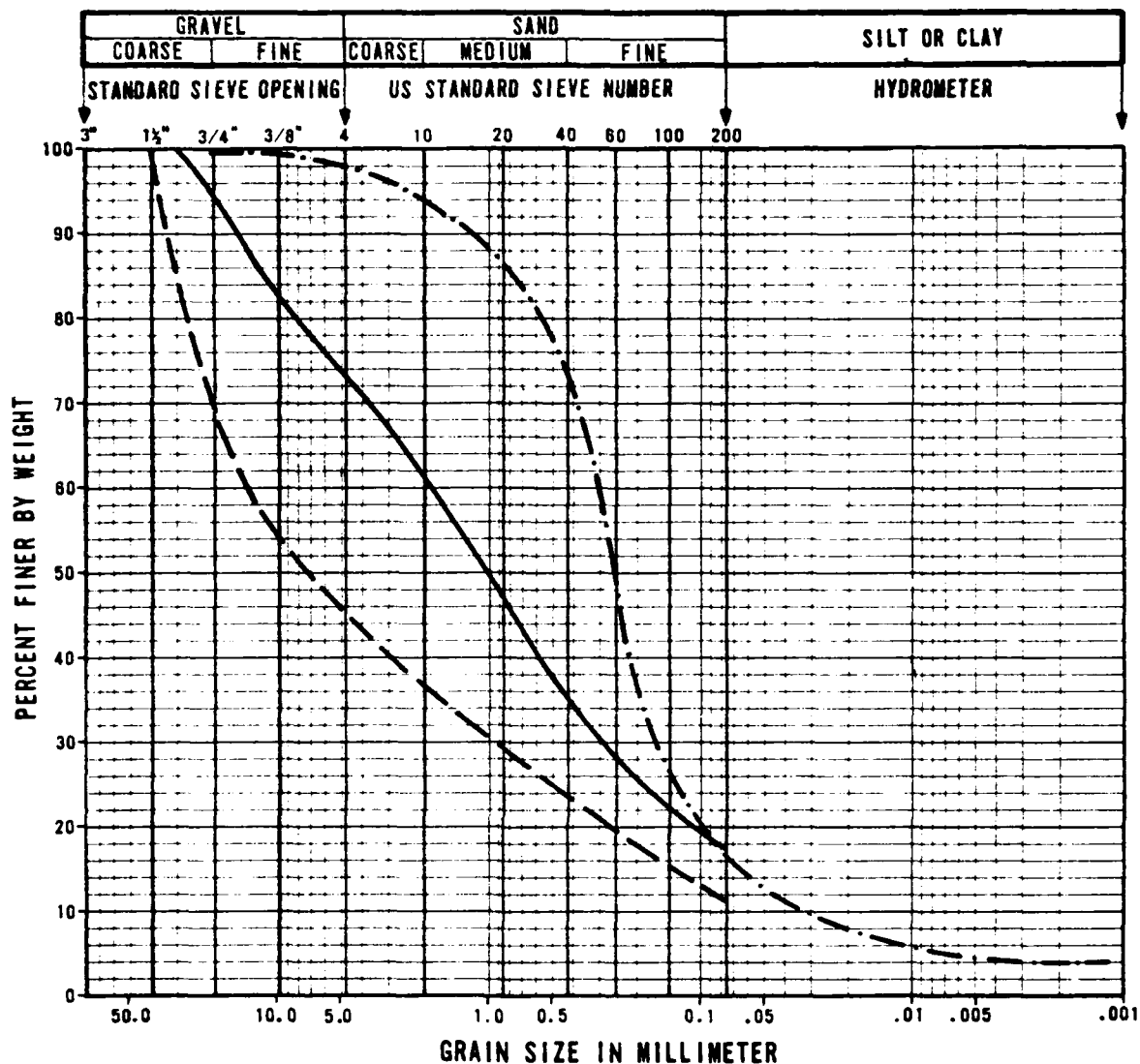
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-13	S-2	10.0-11.0	3.05-3.35				SP/SM
- -	LD-B-13	B-3	10.0-15.0	3.05-4.57		NP		SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-172

FUGRO NATIONAL, INC.



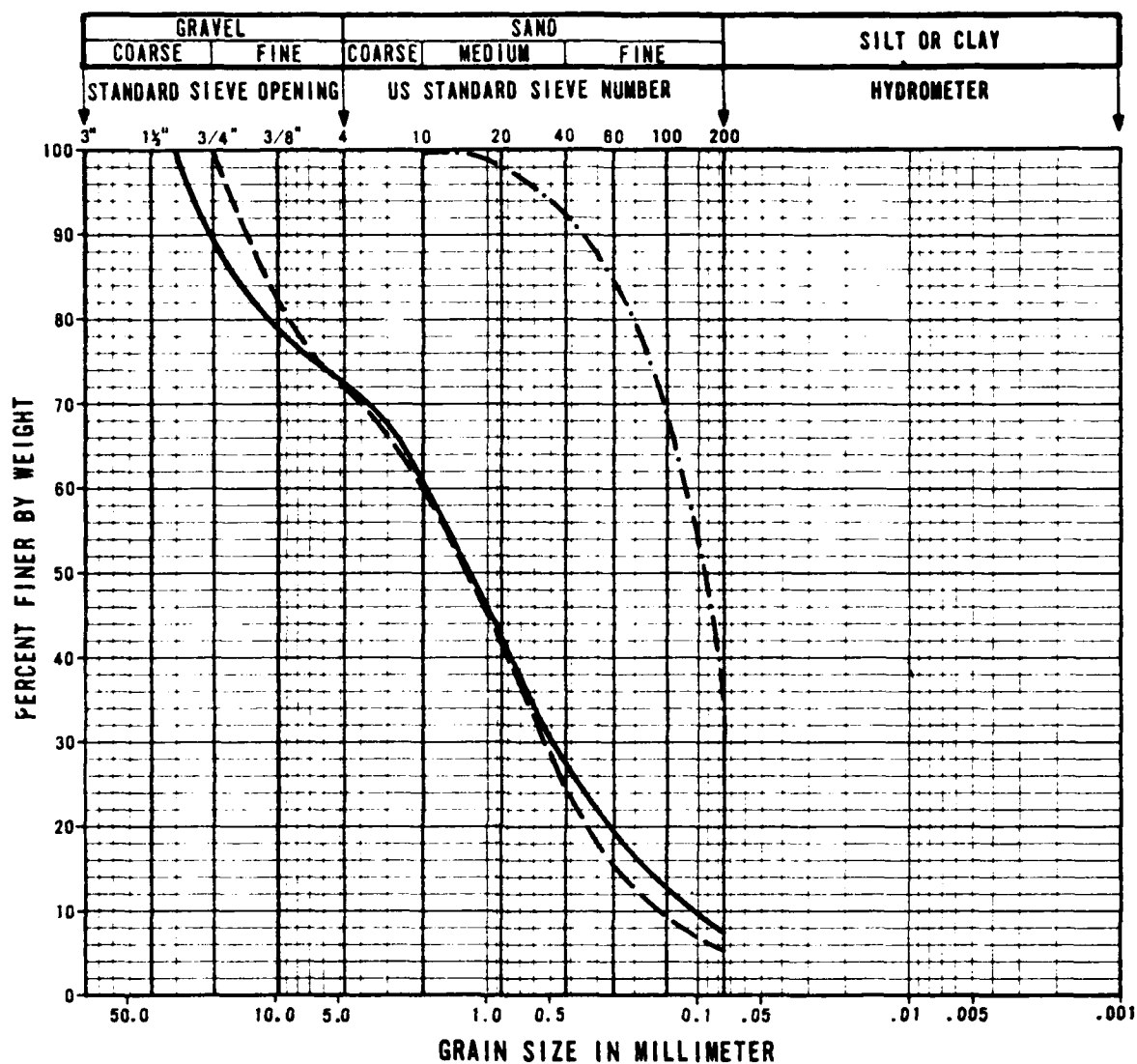
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-13	S-4	15.0-16.5	4.57-5.03				SM
- -	LD-B-13	S-6	30.0-30.3	9.14-9.24				GP/GM
- · -	LD-B-13	S-9	70.0-70.8	21.34-21.58				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-173

FUGRO NATIONAL, INC.



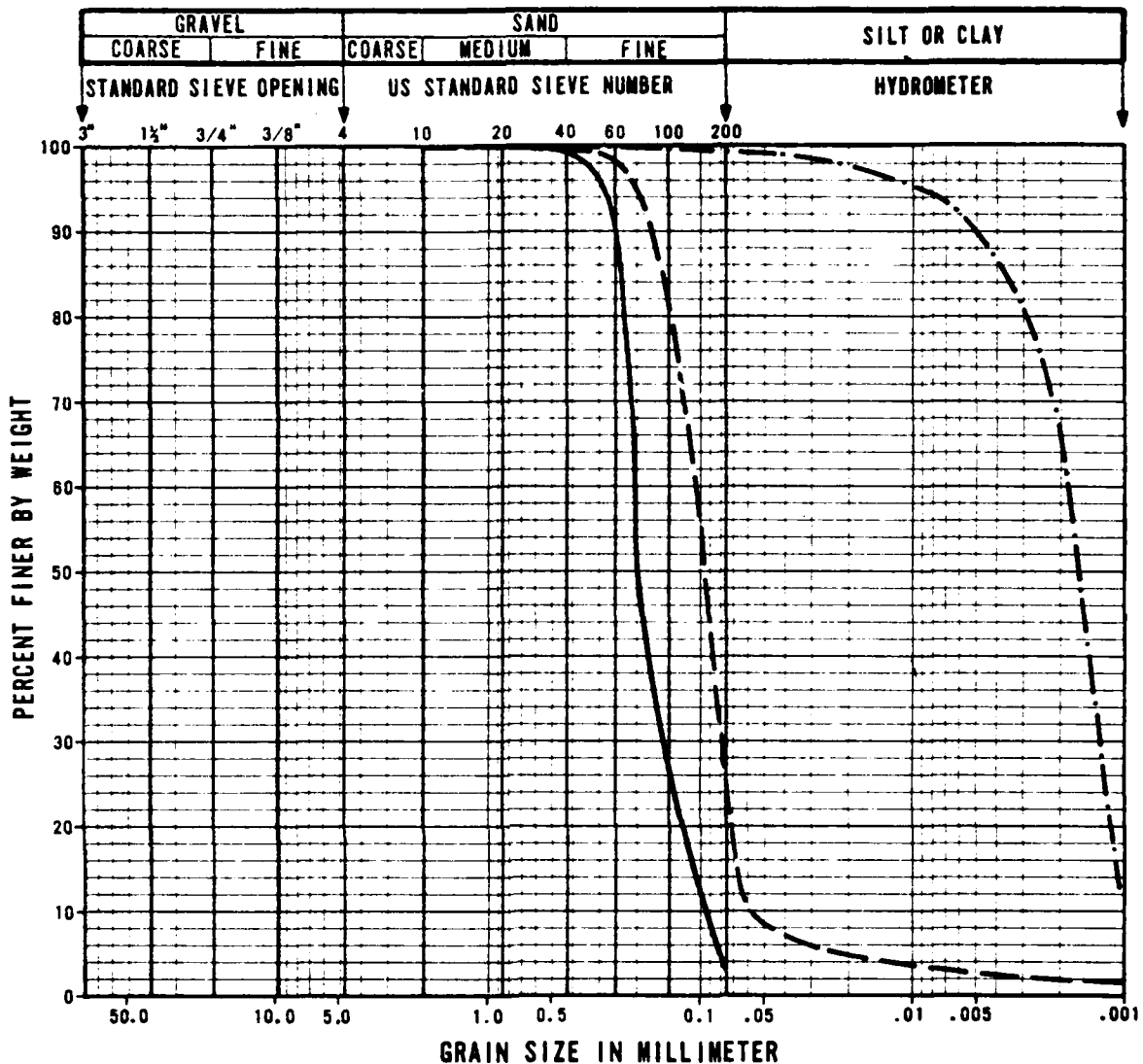
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-14	B-2	5.0-10.0	1.52-3.05				SW/SM
- - -	LD-B-14	S-4	20.0-21.1	6.10-6.43		NP		SP/SM
- · -	LD-B-14	D-6	31.5-32.0	9.60-9.75				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-174

FUGRO NATIONAL, INC.



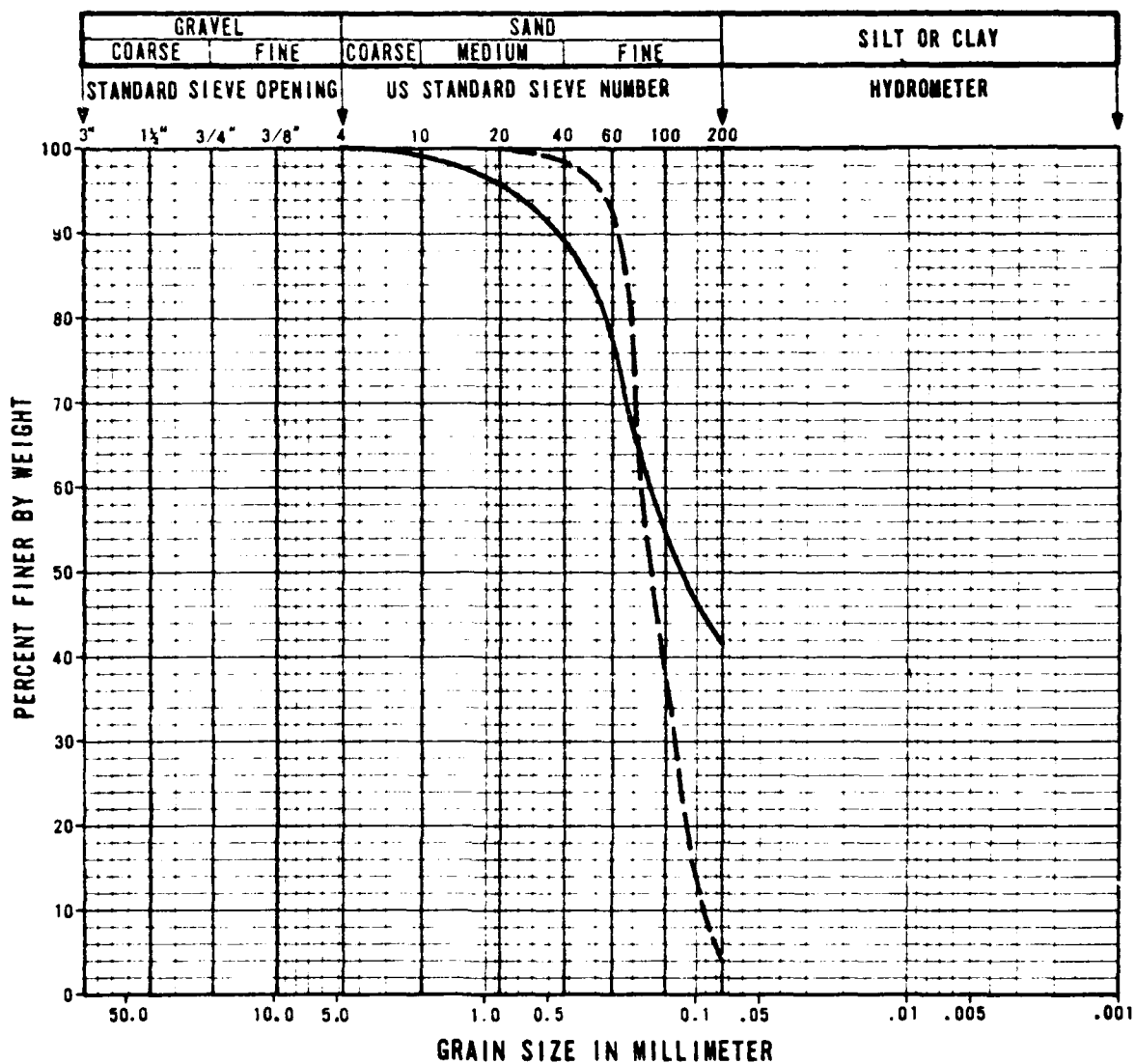
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-14	D-7	40.4-40.9	12.13-12.47				SP
---	LD-B-14	D-8	50.5-51.0	15.39-15.54		NP		SM
-.-.-	LD-B-14	D-9	60.5-61.0	18.44-18.59	75	28	47	CH

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-175

FUGRO NATIONAL, INC.



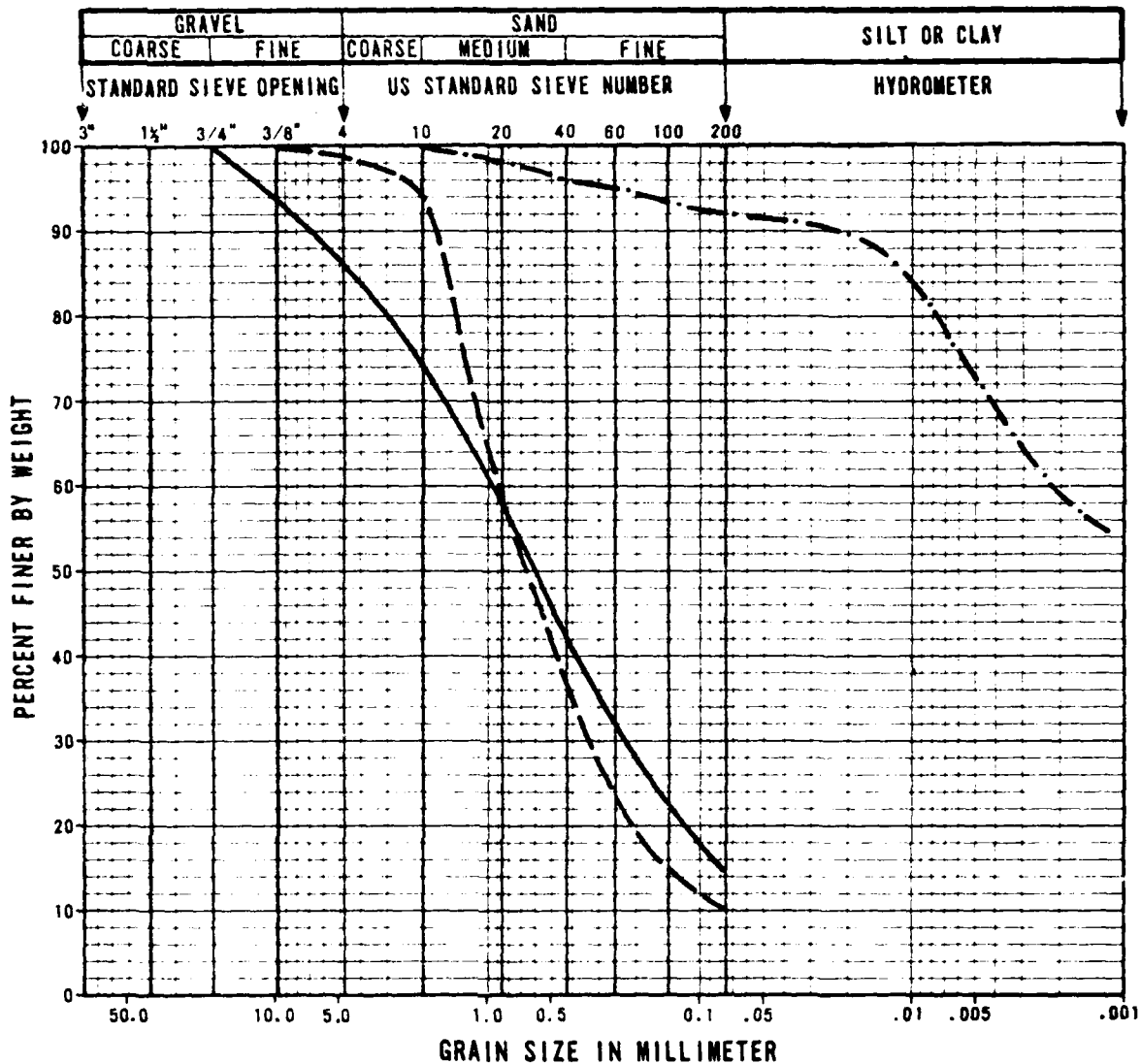
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-14	D-10	72.0-72.5	21.95-22.10				SM
- - -	LD-B-14	D-13	101.0-101.4	30.78-30.91				SP

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-176

FUGRO NATIONAL, INC.



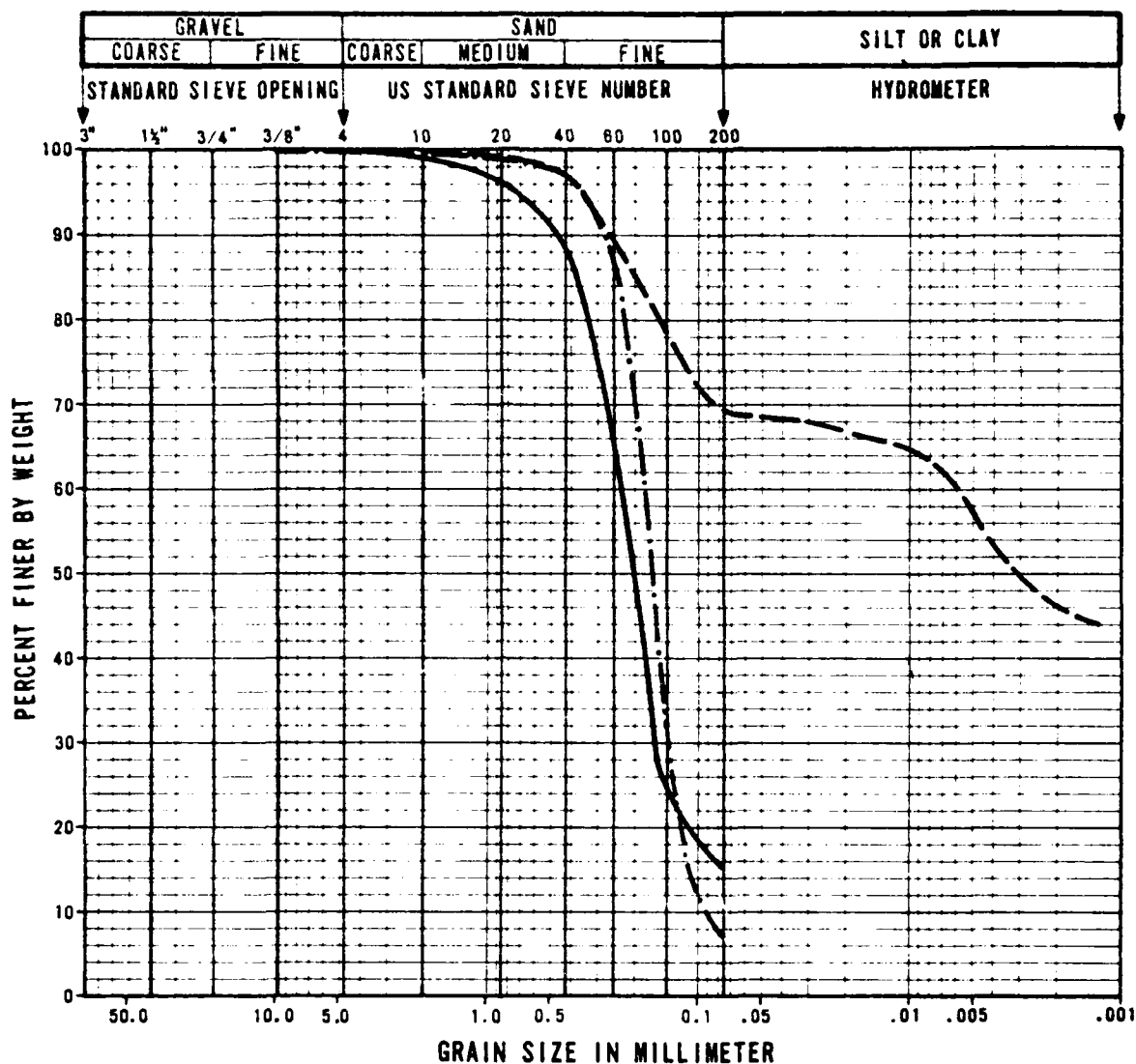
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-15	B-1	0.0-2.5	0.00-0.76		NP		SM
- -	LD-B-15	D-2	5.5-6.0	1.68-1.83				SW/SM
- · -	LD-B-15	D-9	30.2-30.5	9.20-9.30	91	27	64	CH

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-177

FUGRO NATIONAL, INC.

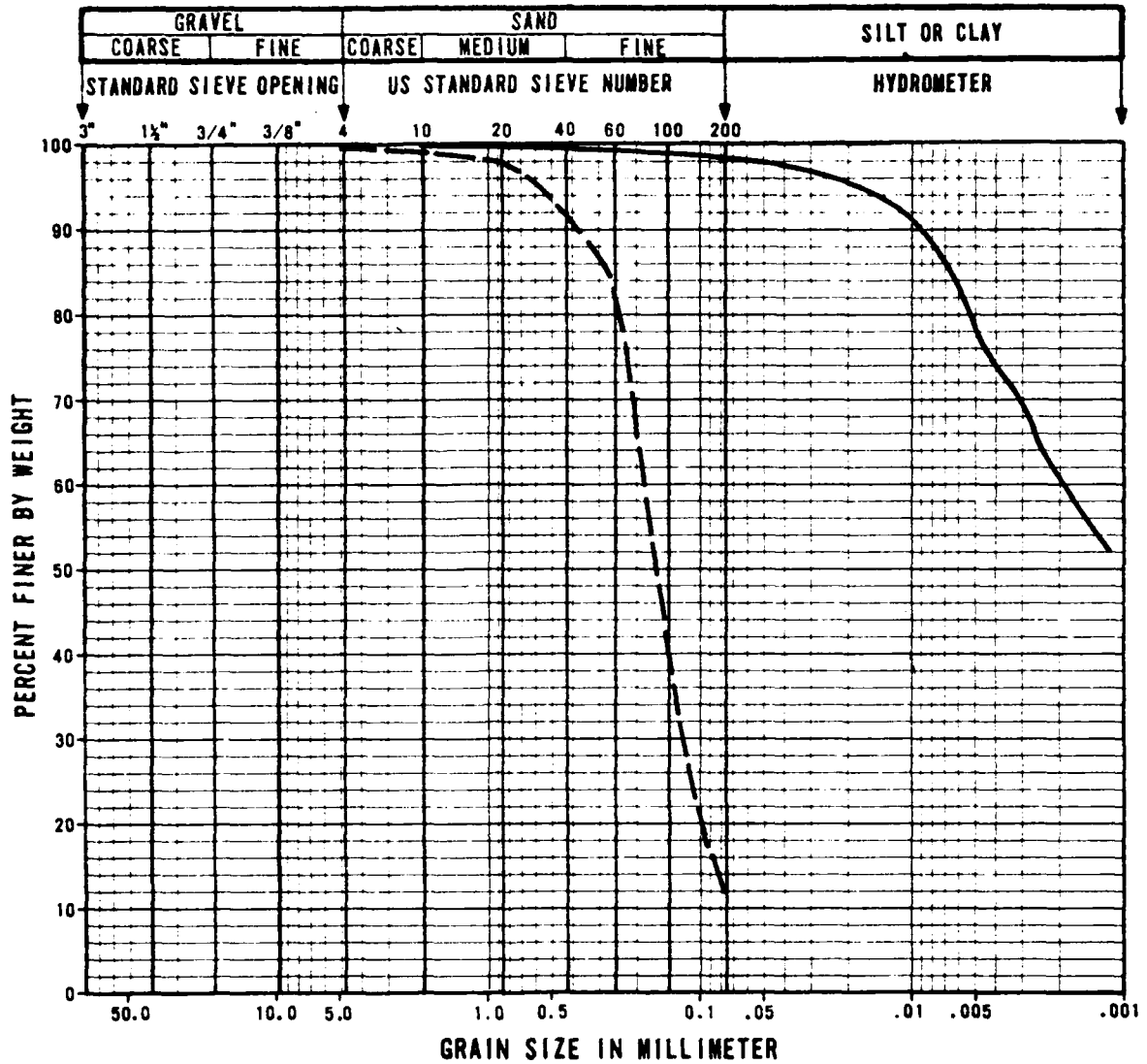


GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-178

FUGRO NATIONAL, INC.



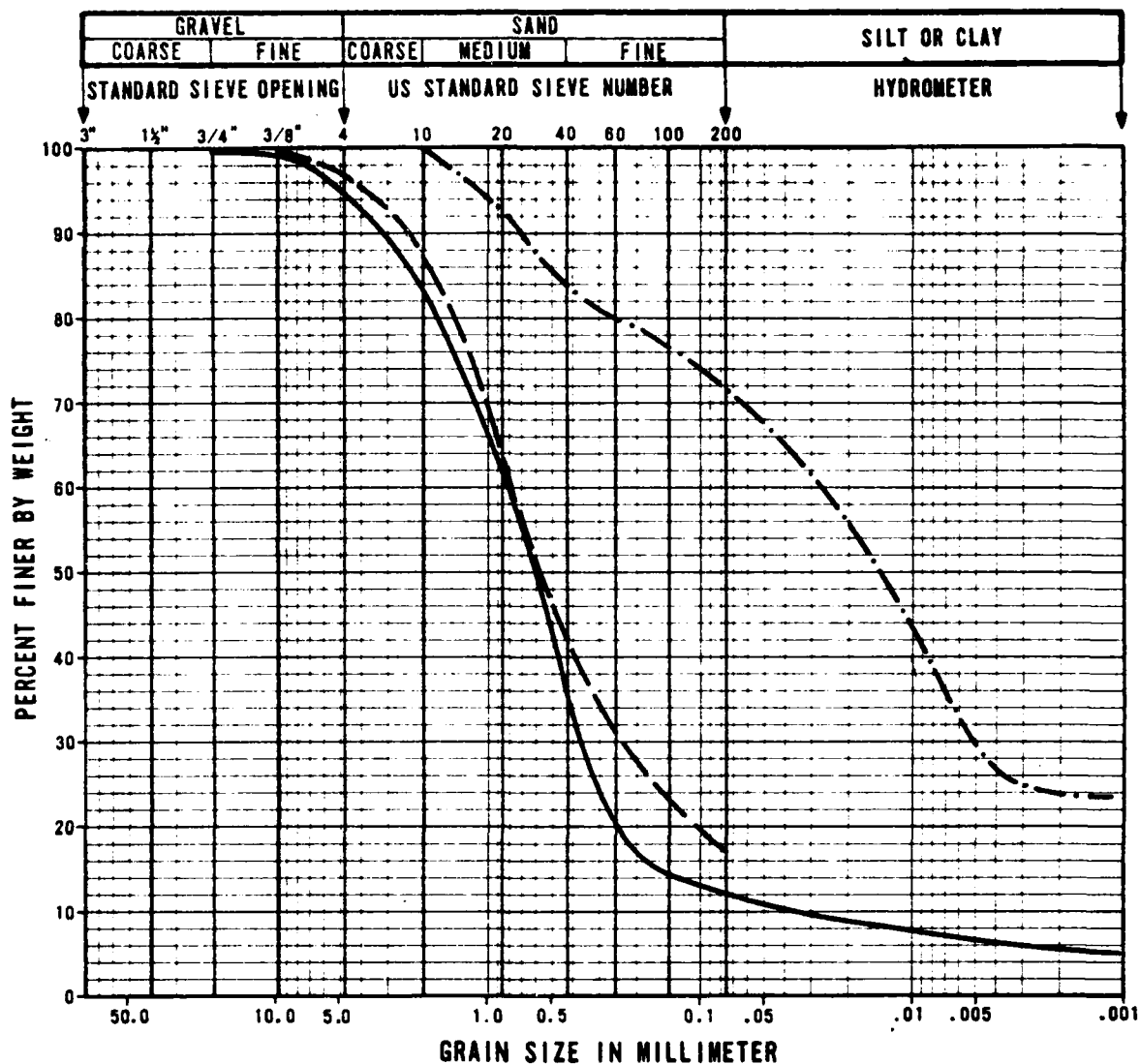
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-15	B-22	81.0-82.5	24.69-25.15	91	31	60	CH
— —	LD-B-15	B-25	93.5-94.5	28.50-28.80		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-179

FUGRO NATIONAL, INC.



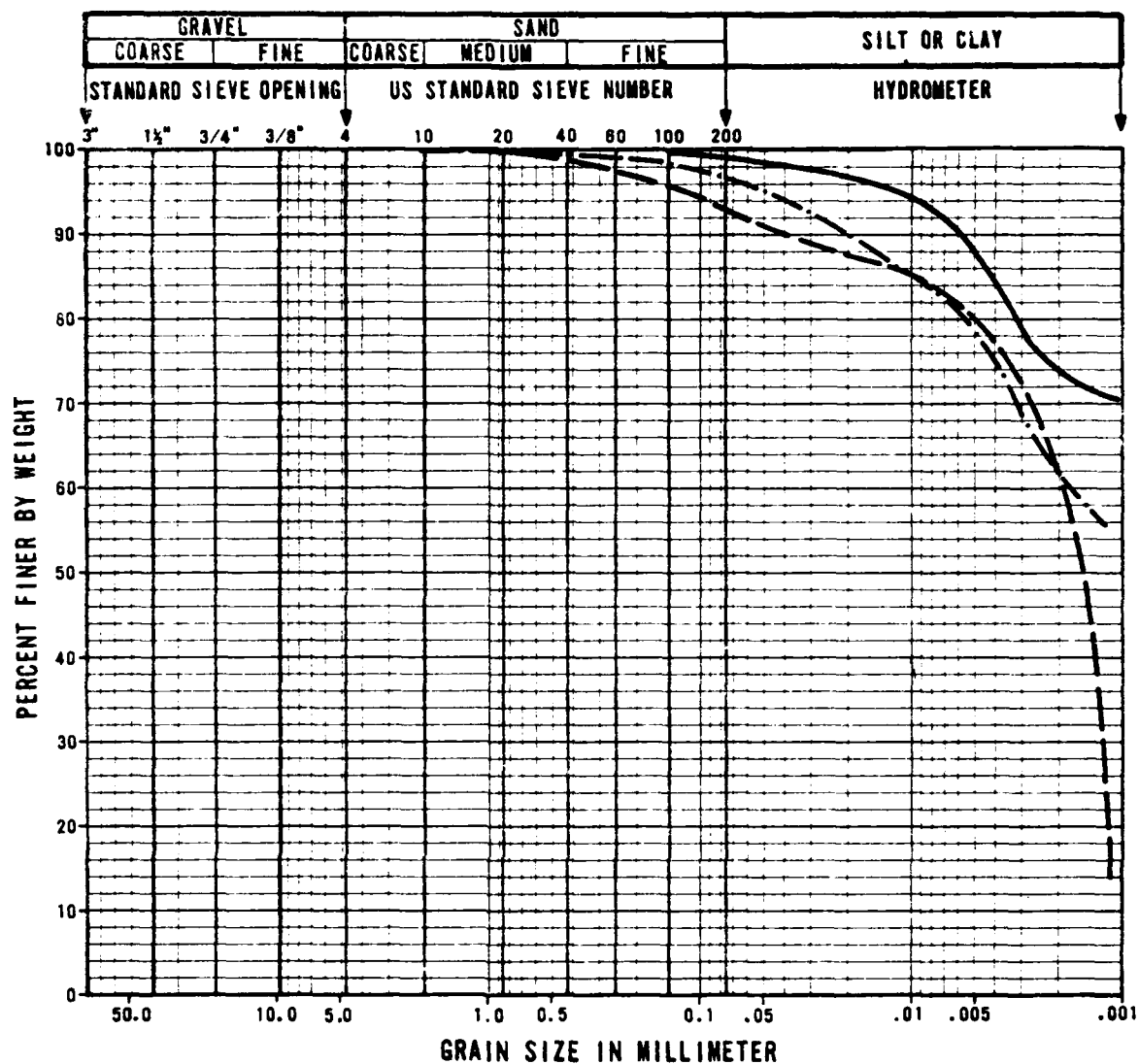
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-16	D-2	6.5-7.0	1.98-2.13	26	16	10	SC
- - -	LD-B-16	B-3	3.0-8.0	0.91-2.44	31	17	14	SC
- · - · -	LD-B-16	B-6	12.0-16.0	3.66-4.88	44	20	24	CL

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-180

UGRO NATIONAL, INC.



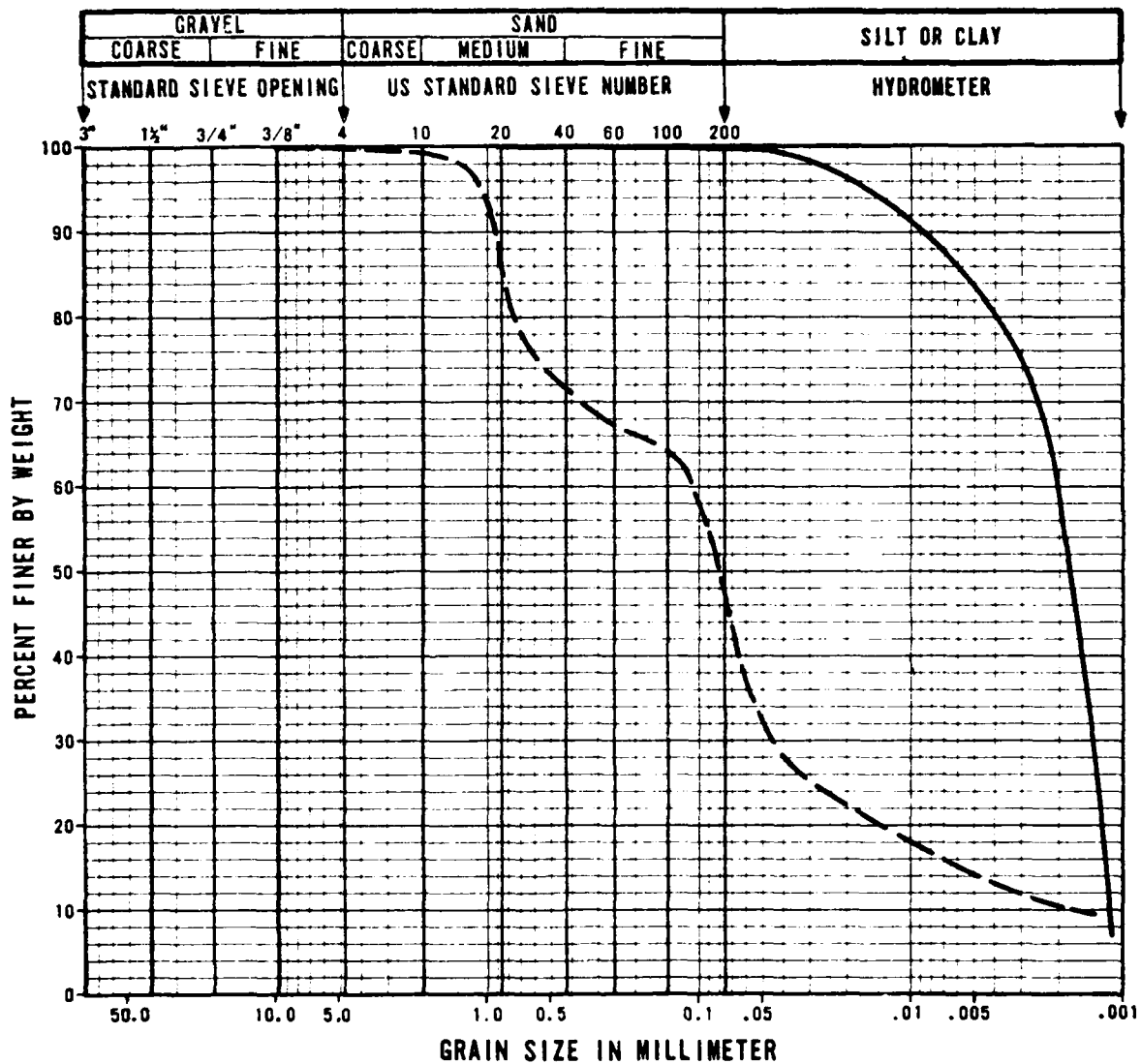
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-16	D-7	20.5-21.0	6.25-6.40	85	26	59	CH
- - -	LD-B-16	D-11	50.5-51.0	15.39-15.54	64	24	40	CH
- · -	LD-B-16	D-13	70.5-71.0	21.49-21.64	77	28	49	CH

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-181

FUGRO NATIONAL, INC.



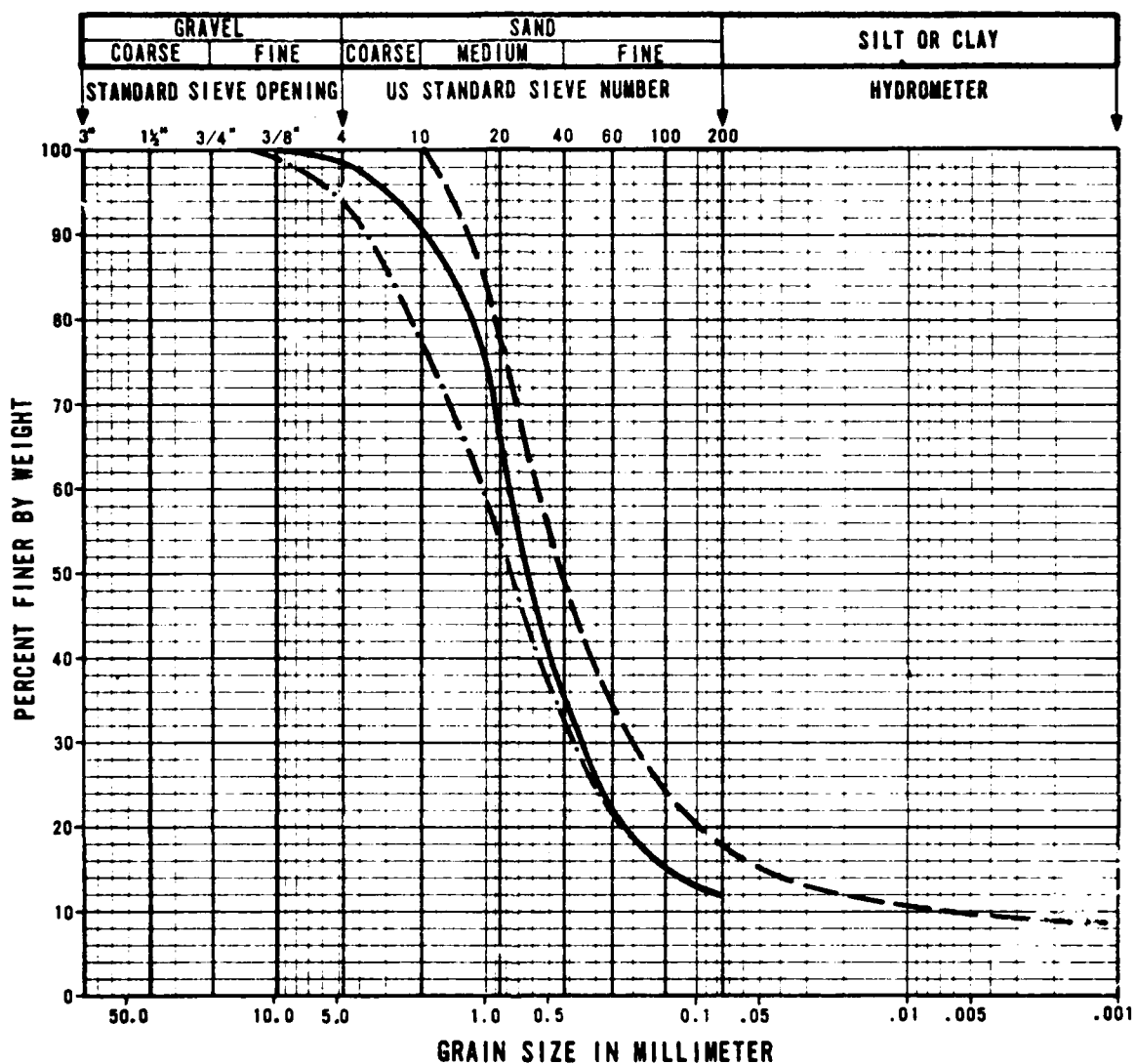
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-8-16	D-15	90.0-90.5	27.43-27.58	82	28	54	CH
- - -	LD-8-16	D-16	100.1-100.6	30.51-30.66	30	24	6	SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-182

FUGRO NATIONAL, INC.



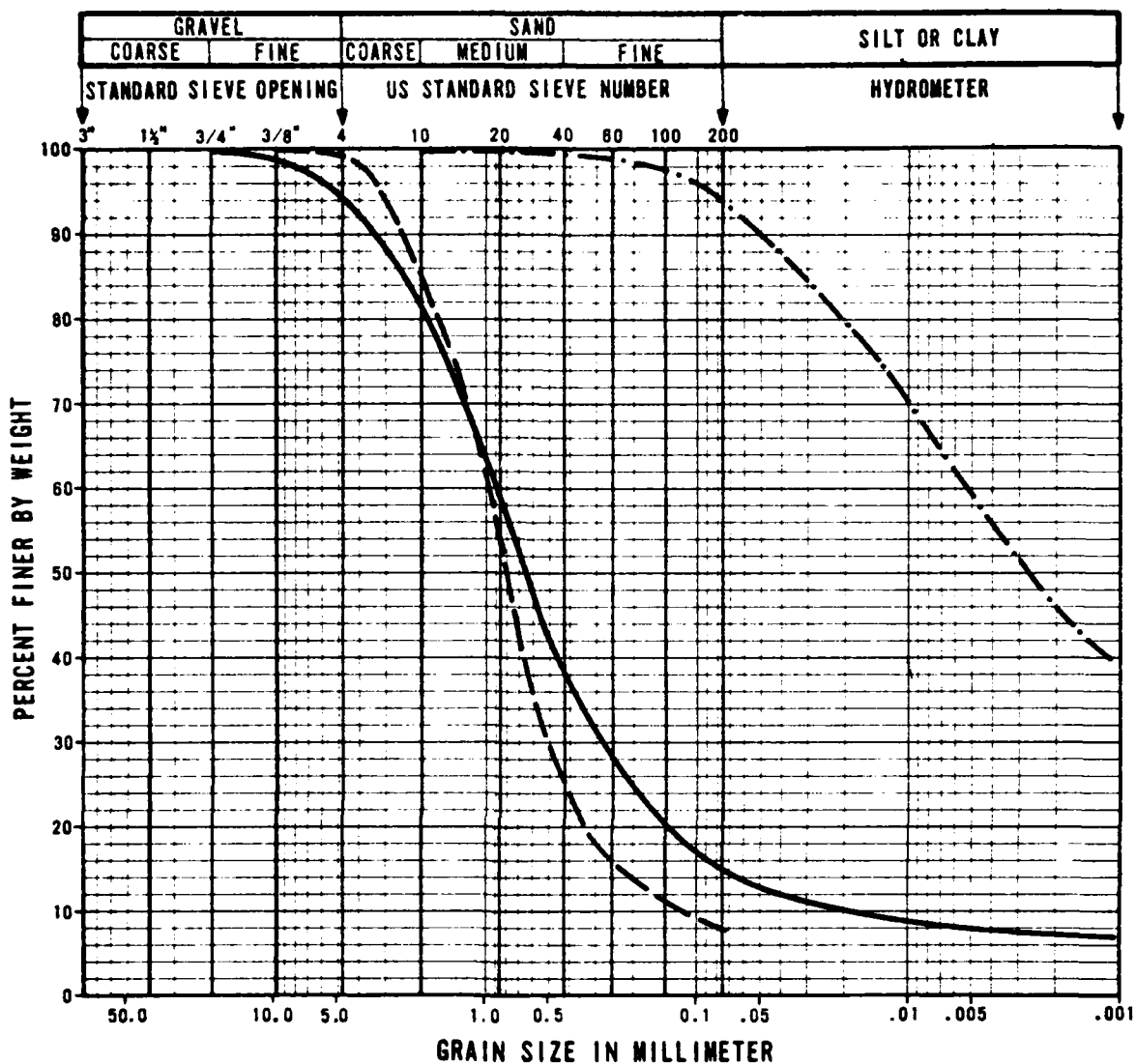
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-17	P-1	5.0-7.1	1.52-2.16				SP/SW
- - -	LD-B-17	P-2	10.0-10.6	3.05-3.23				SM
- · -	LD-B-17	P-3	15.0-16.8	4.57-5.12		NP		SW/SW

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-'83

FUGRO NATIONAL, INC.



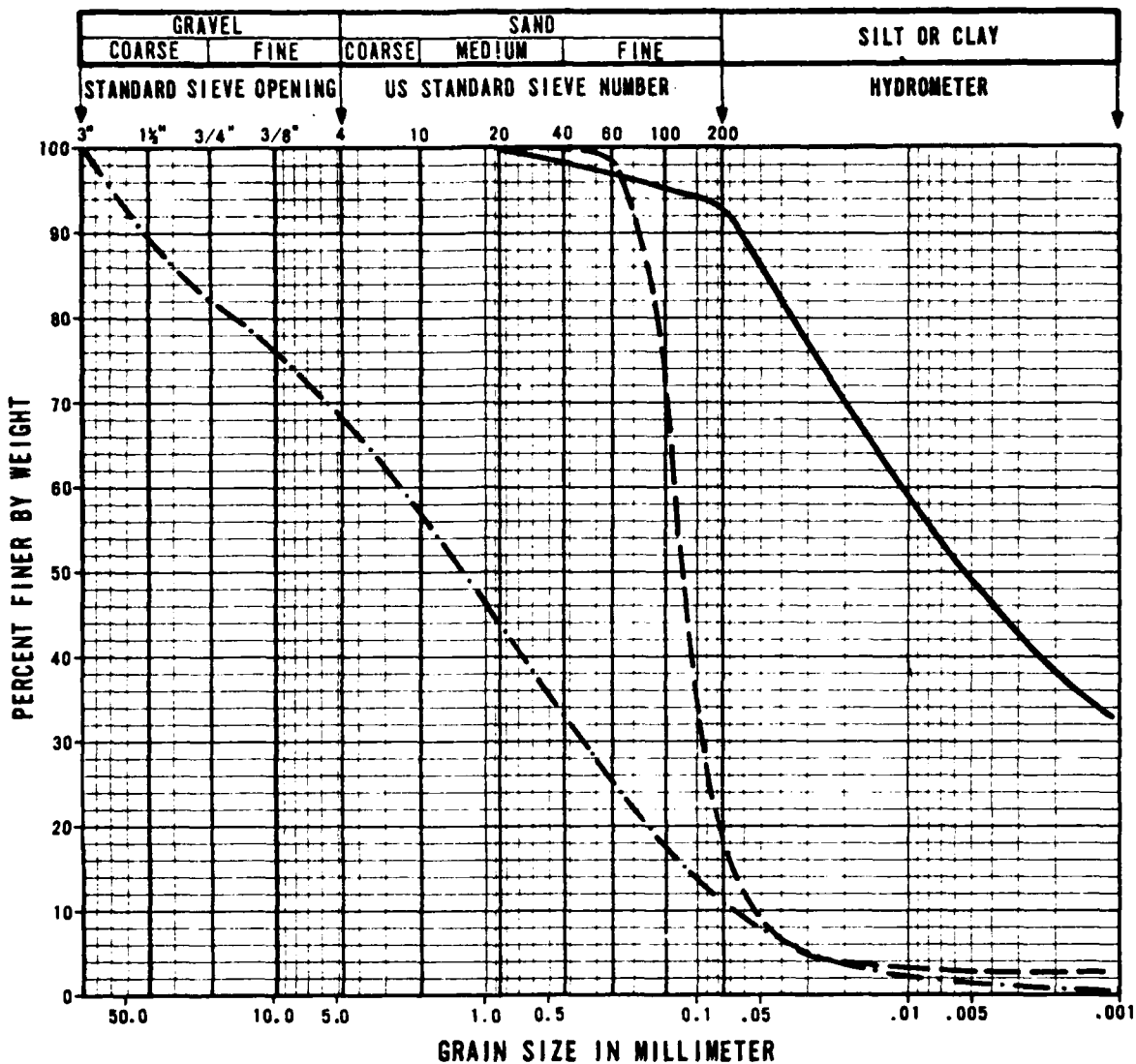
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-17	P-4	20.6-21.2	6.28-6.46				SC
- - -	LD-B-17	P-4	21.5-22.1	6.55-6.74		NP		SW/SM
- · -	LD-B-17	P-5	30.5-31.2	9.30-9.51	60	23	37	CH

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-184

FUGRO NATIONAL, INC.



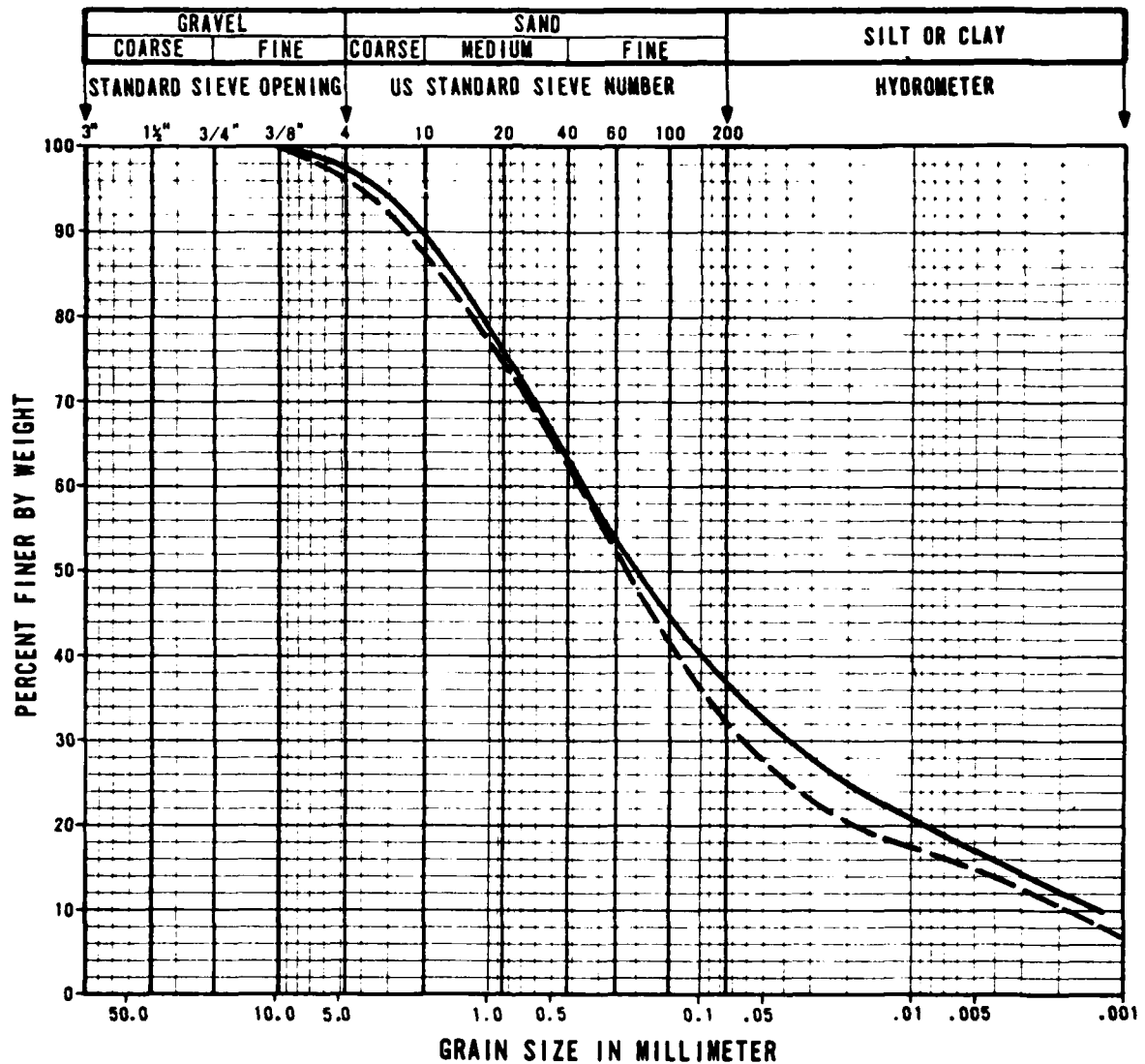
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-17	P-7	50.6-51.1	15.42-15.58				CL
- - -	LD-B-17	P-8	60.0-62.3	18.29-18.99		NP		SM
- · - ·	LD-B-17	P-9	70.0-70.6	21.34-21.52				SP/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-185

FUGRO NATIONAL, INC.



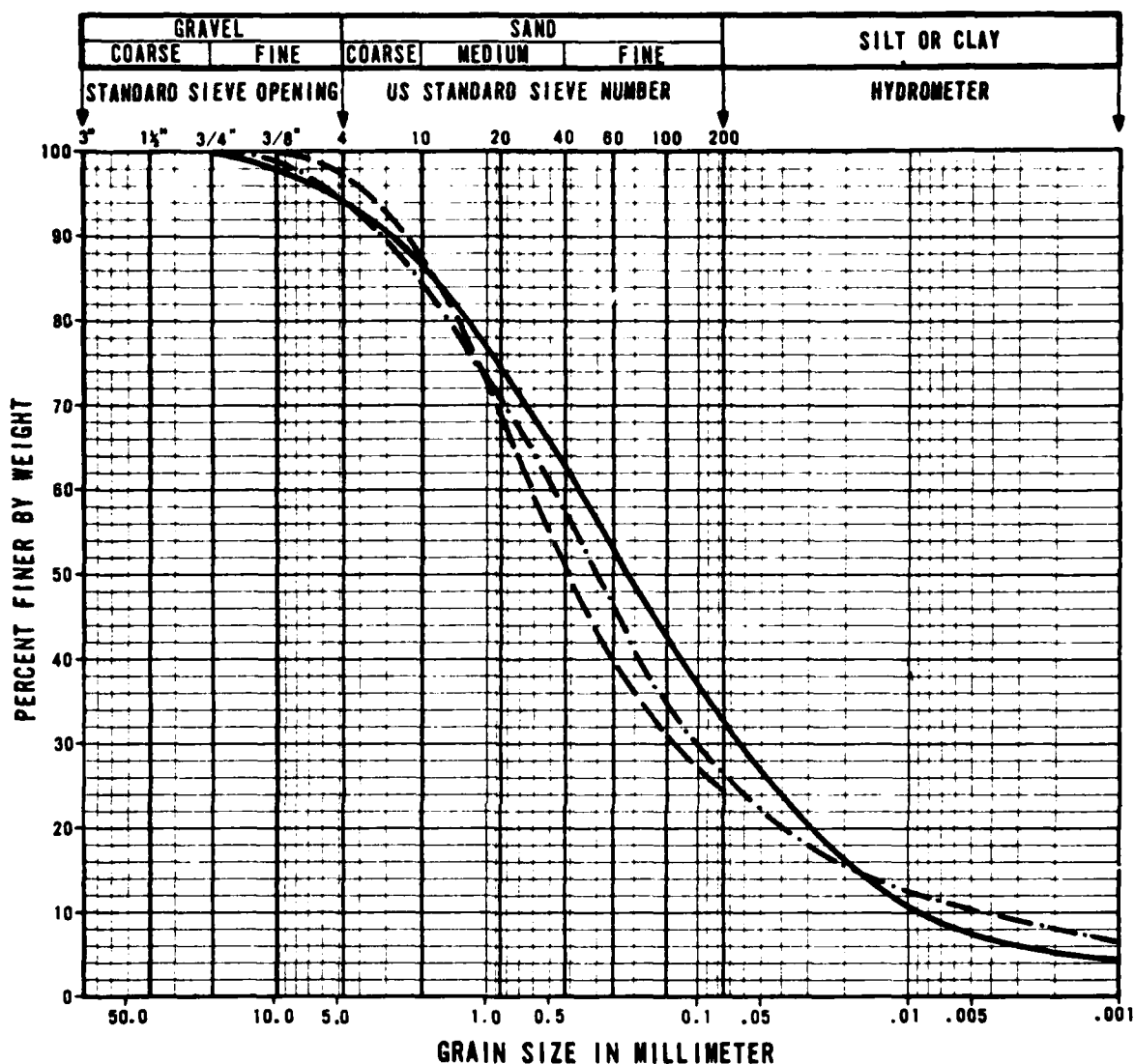
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-8-18	B-2	1.0-3.0	0.30-0.91	41	19	22	SC
- -	LD-8-18	D-5	10.5-11.0	3.20-3.35	25	21	4	SM/SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-186

FUGRO NATIONAL, INC.



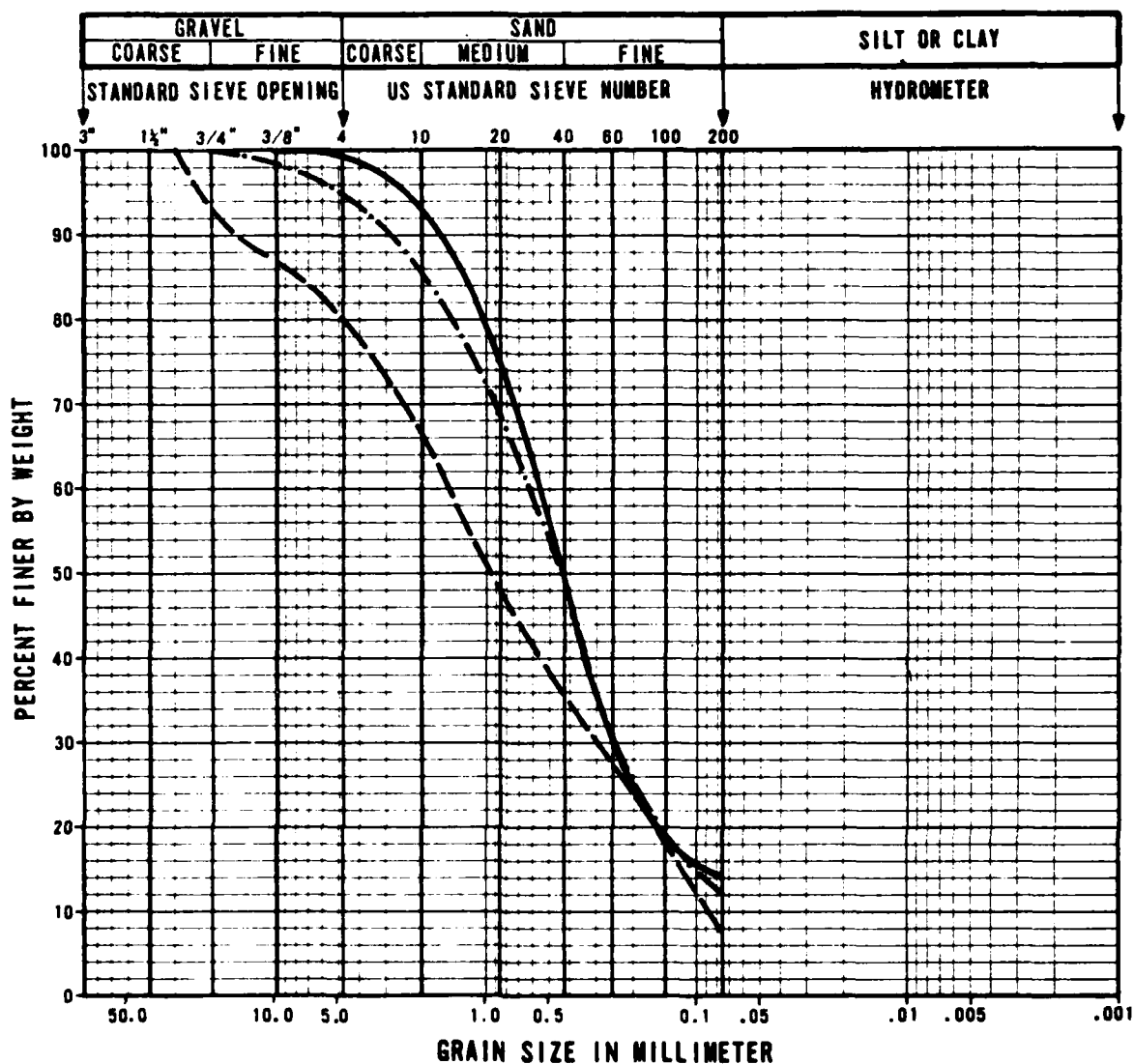
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-18	D-9	20.5-21.0	6.25-6.40	25	17	8	SC
— —	LD-B-18	B-10	22.0-23.5	6.71-7.16	26	18	8	SC
- - -	LD-B-18	D-12	30.5-31.0	9.30-9.45	27	20	7	SC/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-187

FUGRO NATIONAL INC.



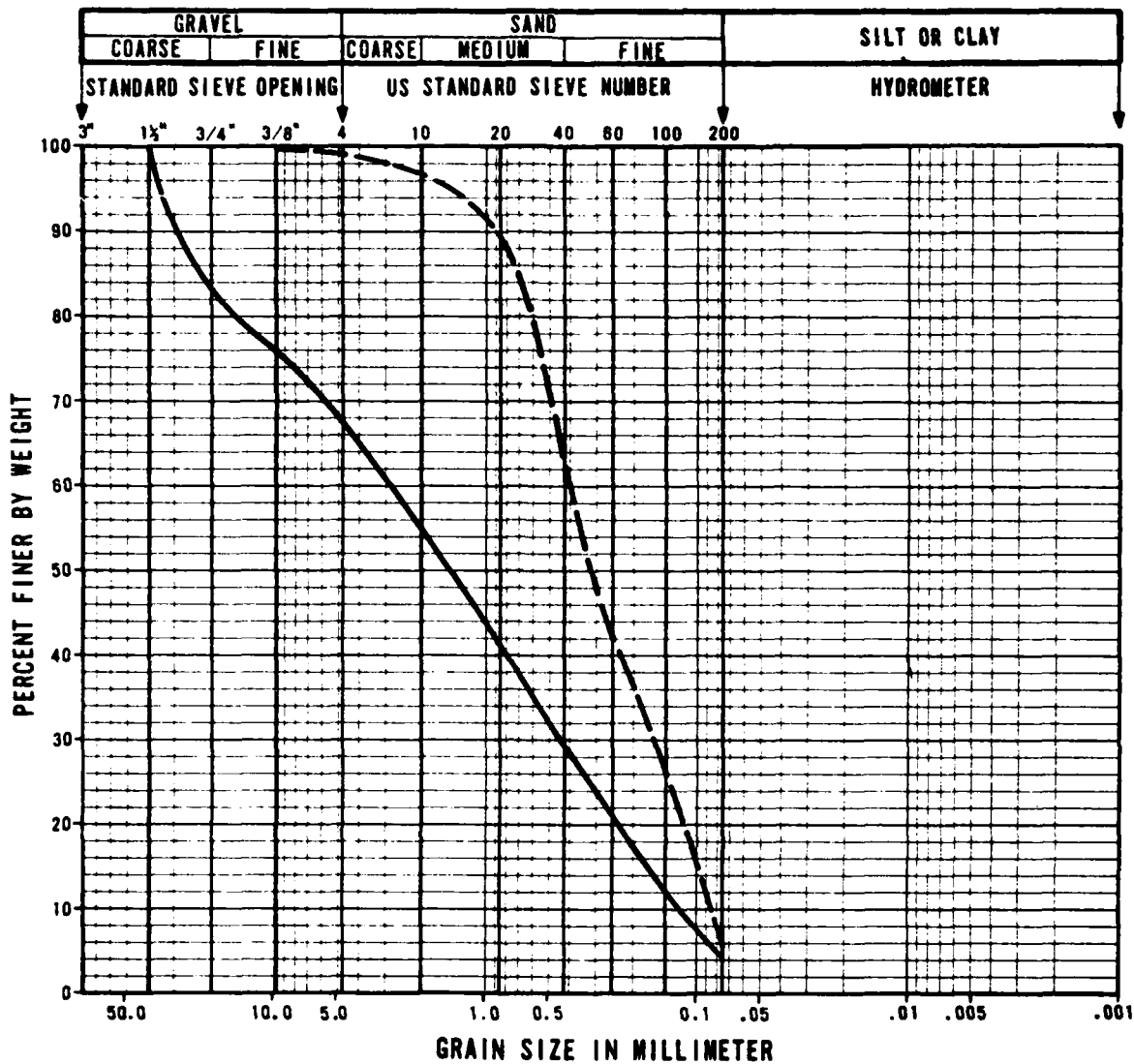
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-18	B-14	38.0-38.5	11.58-11.73	29	18	11	SC
- -	LD-B-18	B-21	67.0-67.5	20.42-20.57				SP/SW
- · -	LD-B-18	B-24	80.0-81.0	24.38-24.69				SW/SW

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS

FIGURE
C-188

FUGRO NATIONAL, INC.



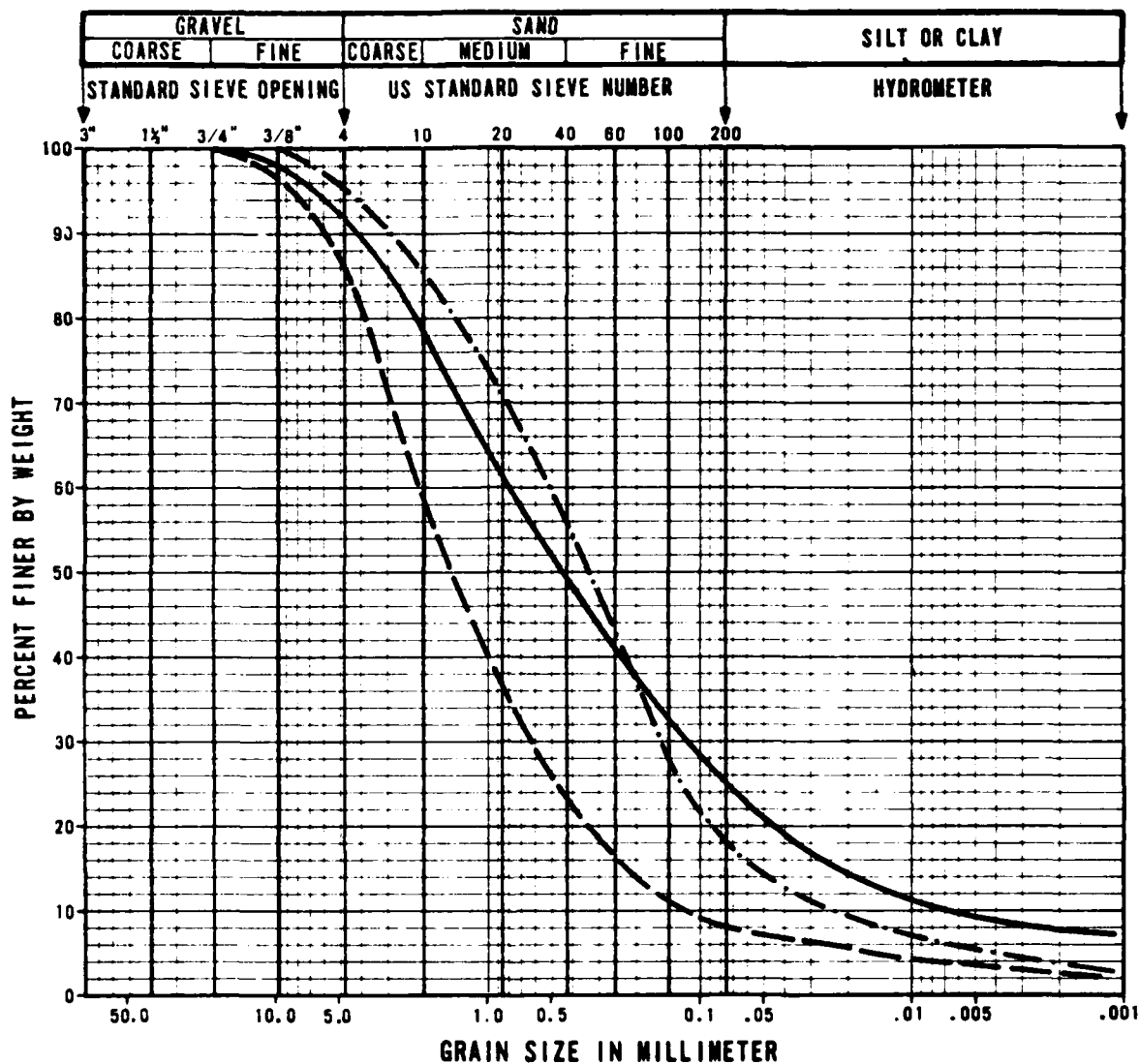
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-B-18	B-29	92.5-93.5	28.19-28.50				SP
- - -	LD-B-18	B-30	96.0-96.5	29.26-29.41				SP

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-189

FUGRO NATIONAL, INC.



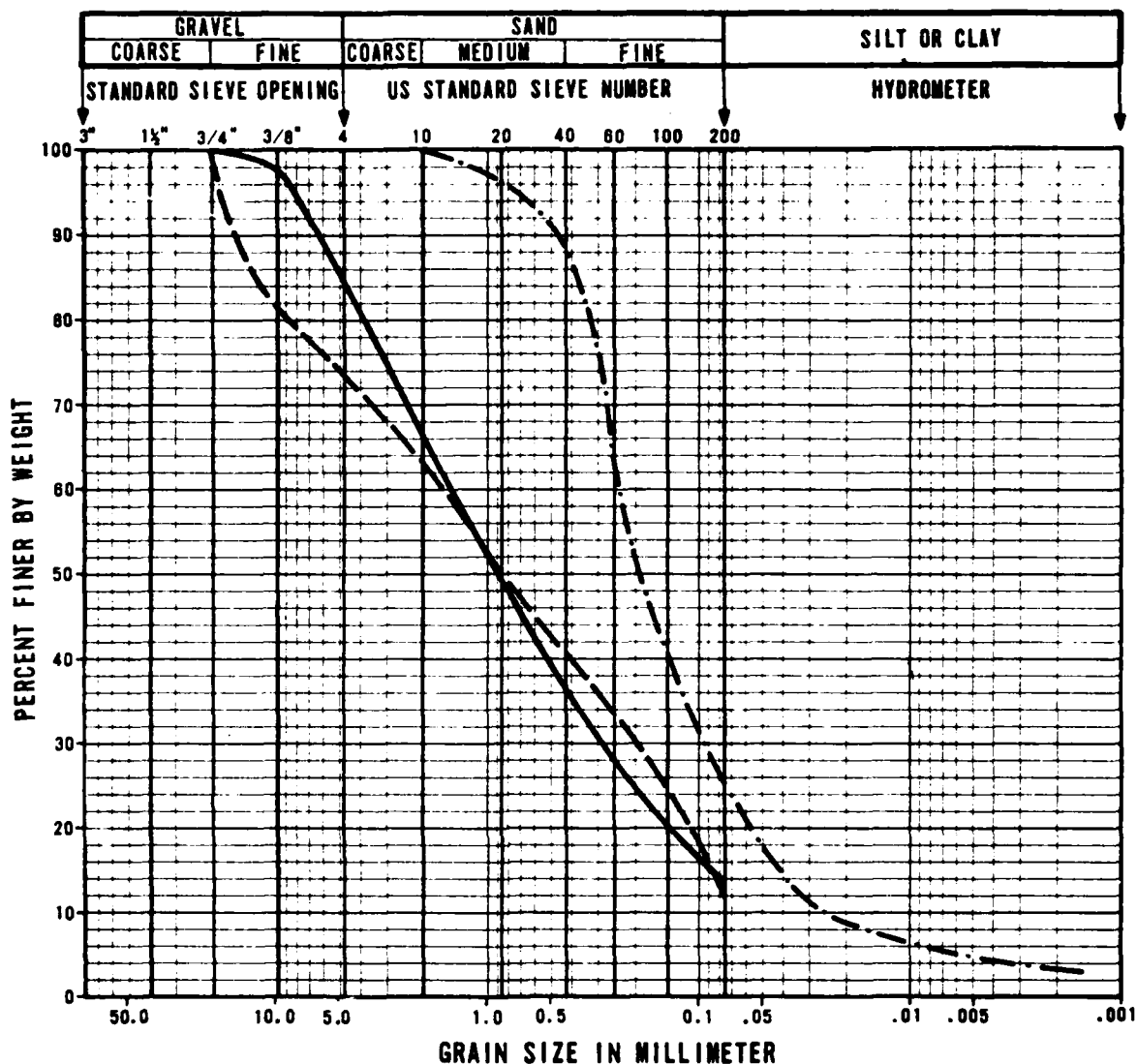
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-1	P-1	5.6-6.2	1.71-1.89	26	20	6	SC/SM
- -	LD-C-1	P-2	15.0-15.6	4.57-4.75				SW/SM
- · -	LD-C-1	P-4	30.6-31.2	9.33-9.51				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-190

FUGRO NATIONAL, INC.

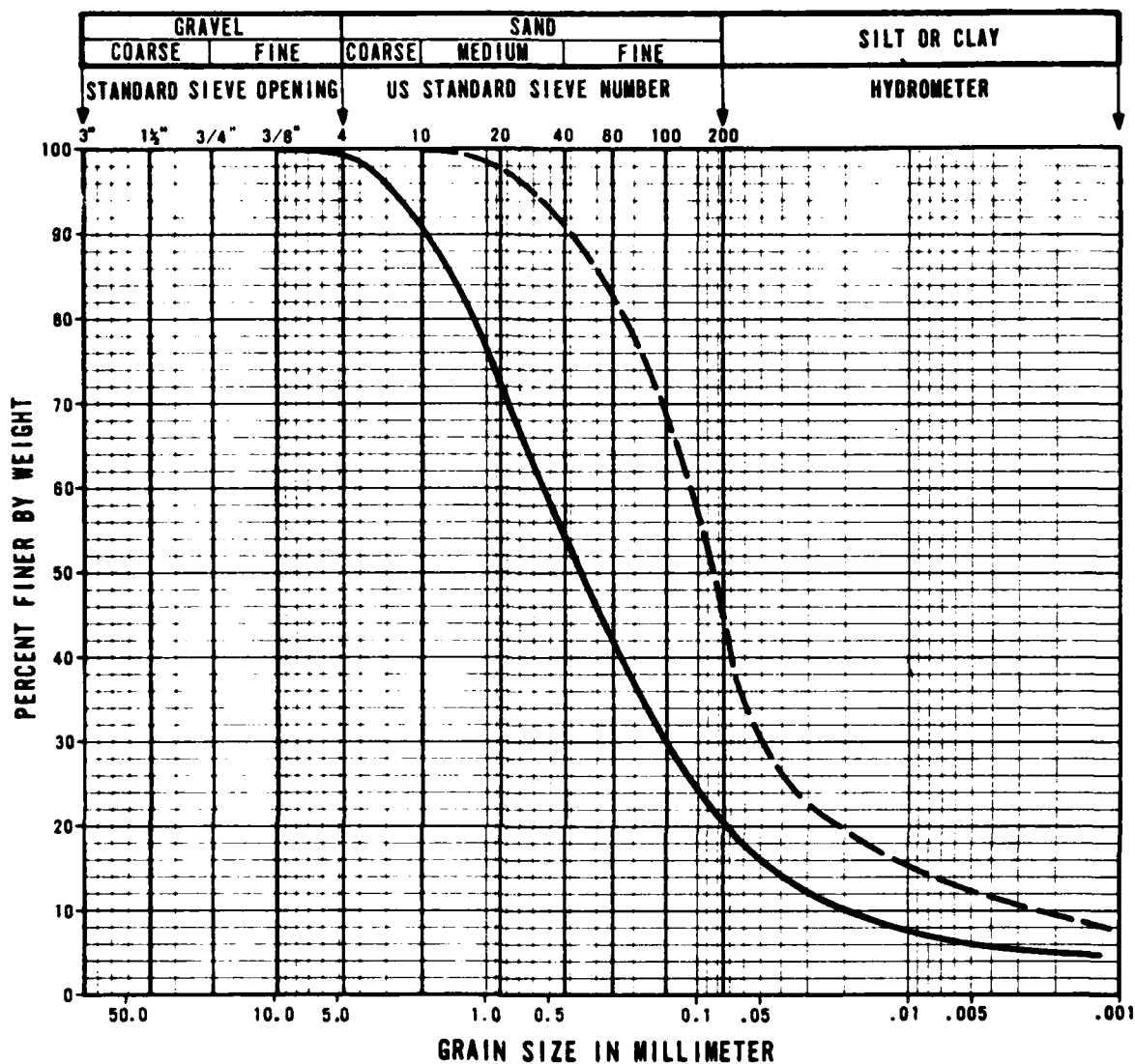


GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-191

FUGRO NATIONAL, INC.



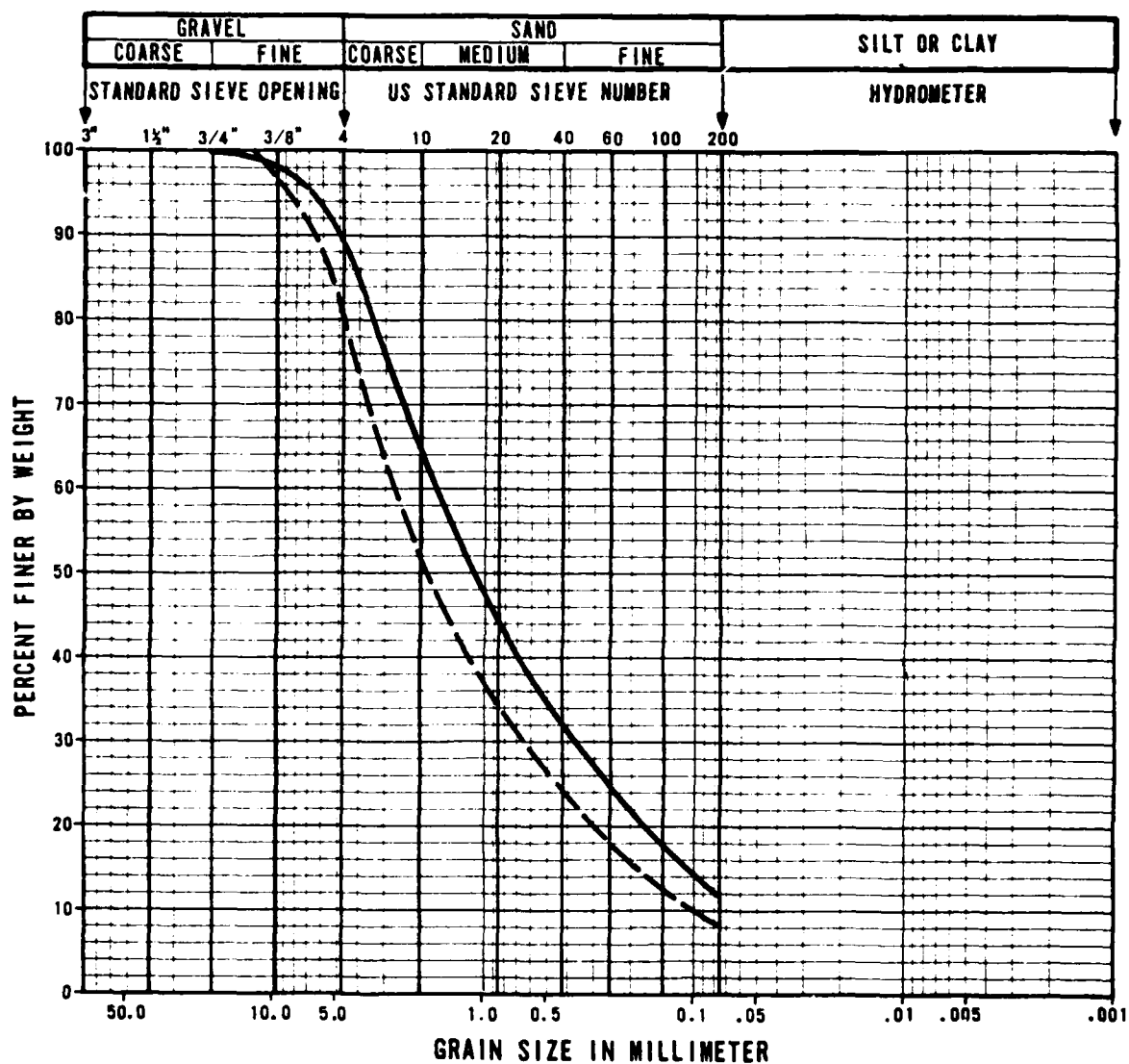
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-1	P-12	125.0-125.4	38.10-38.22		NP		SM
- - -	LD-C-1	P-13	151.6-152.1	46.21-46.36	27	18	9	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-192

FUGRO NATIONAL, INC.



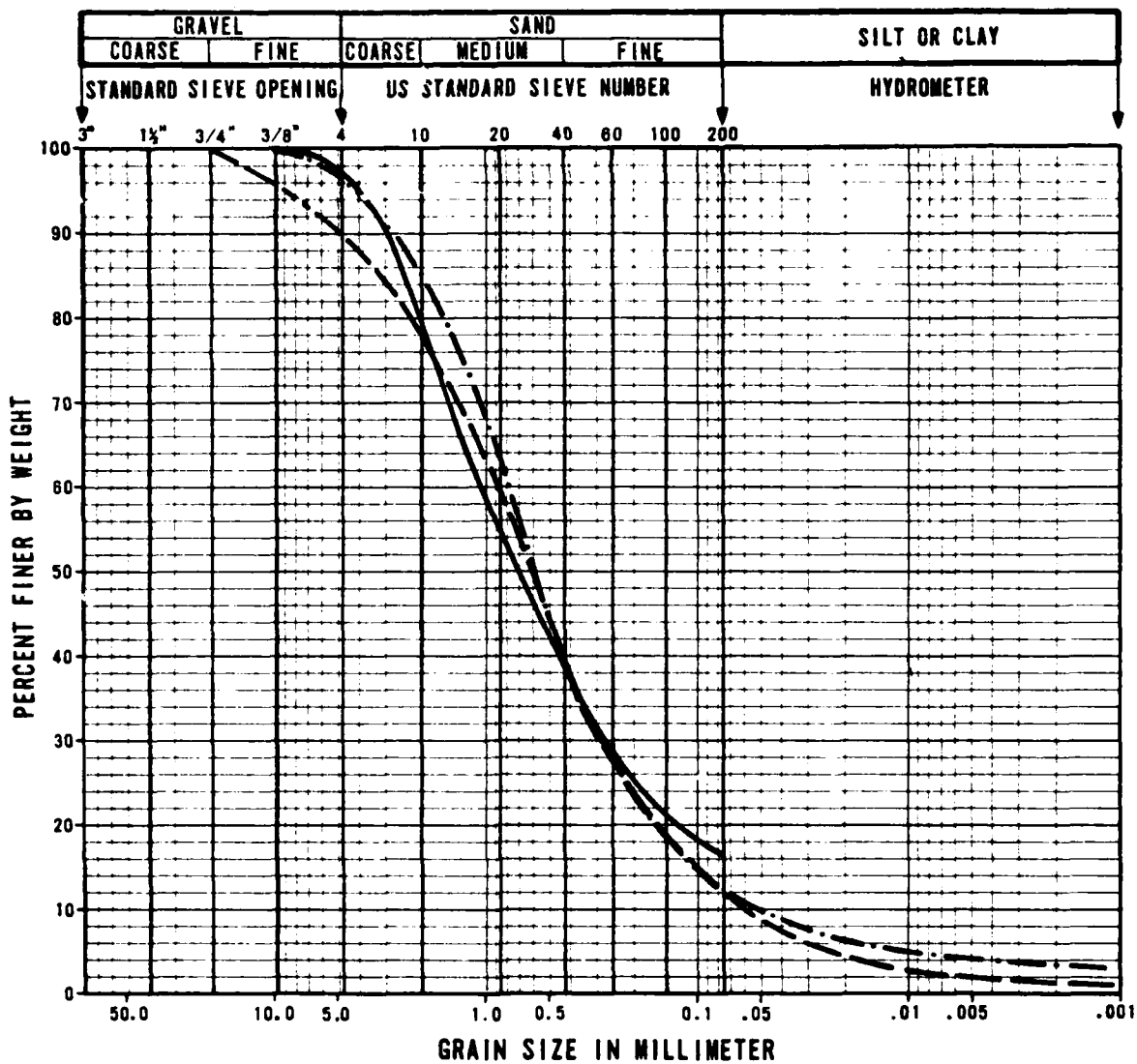
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-1	P-15	200.0-201.6	60.96-61.45				SW/SM
- -	LD-C-1	P-17	252.0-252.3	76.81-76.90				SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-193

FUGRO NATIONAL, INC.

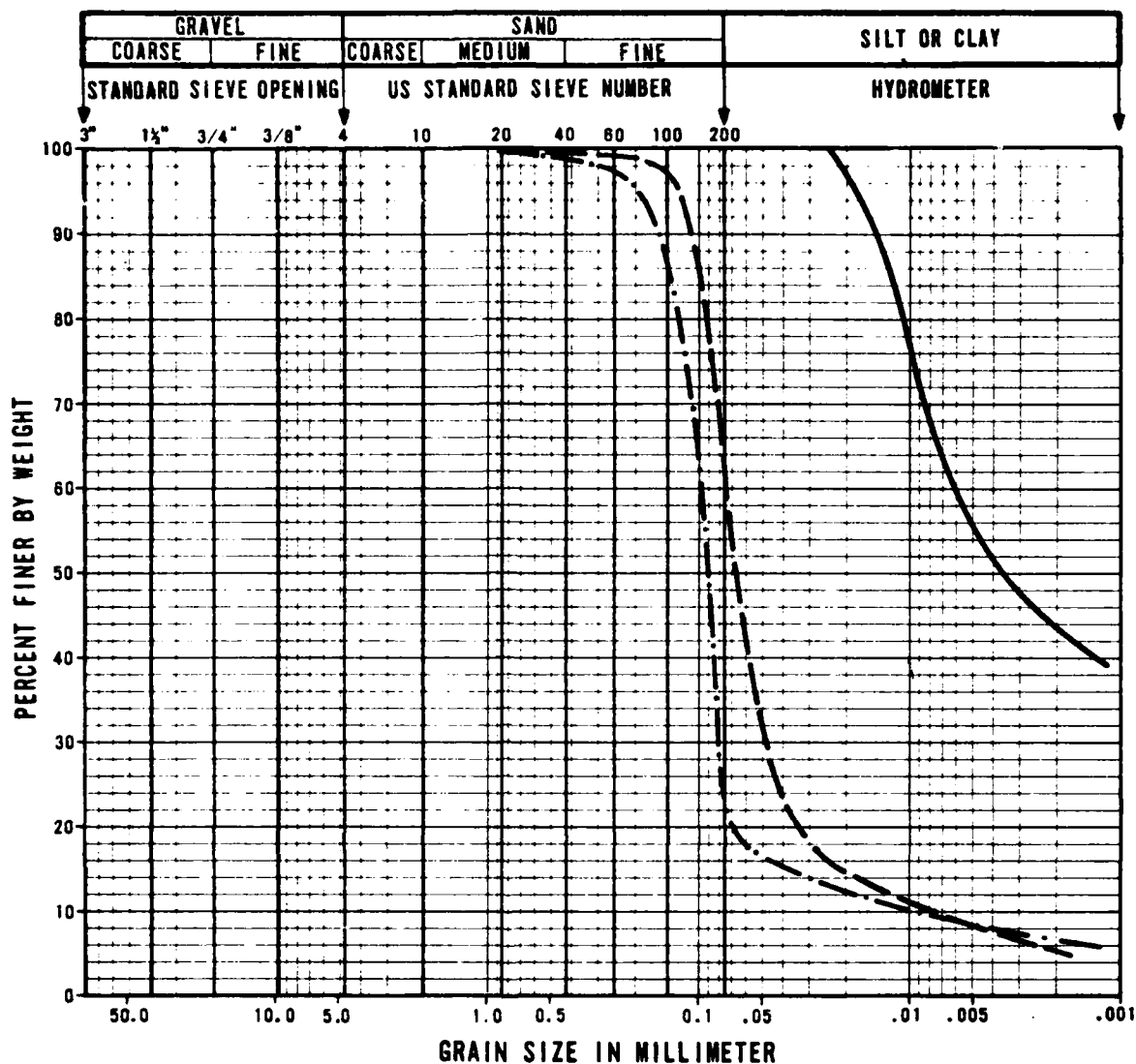


GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS

FIGURE
C-194

FUGRO NATIONAL, INC.



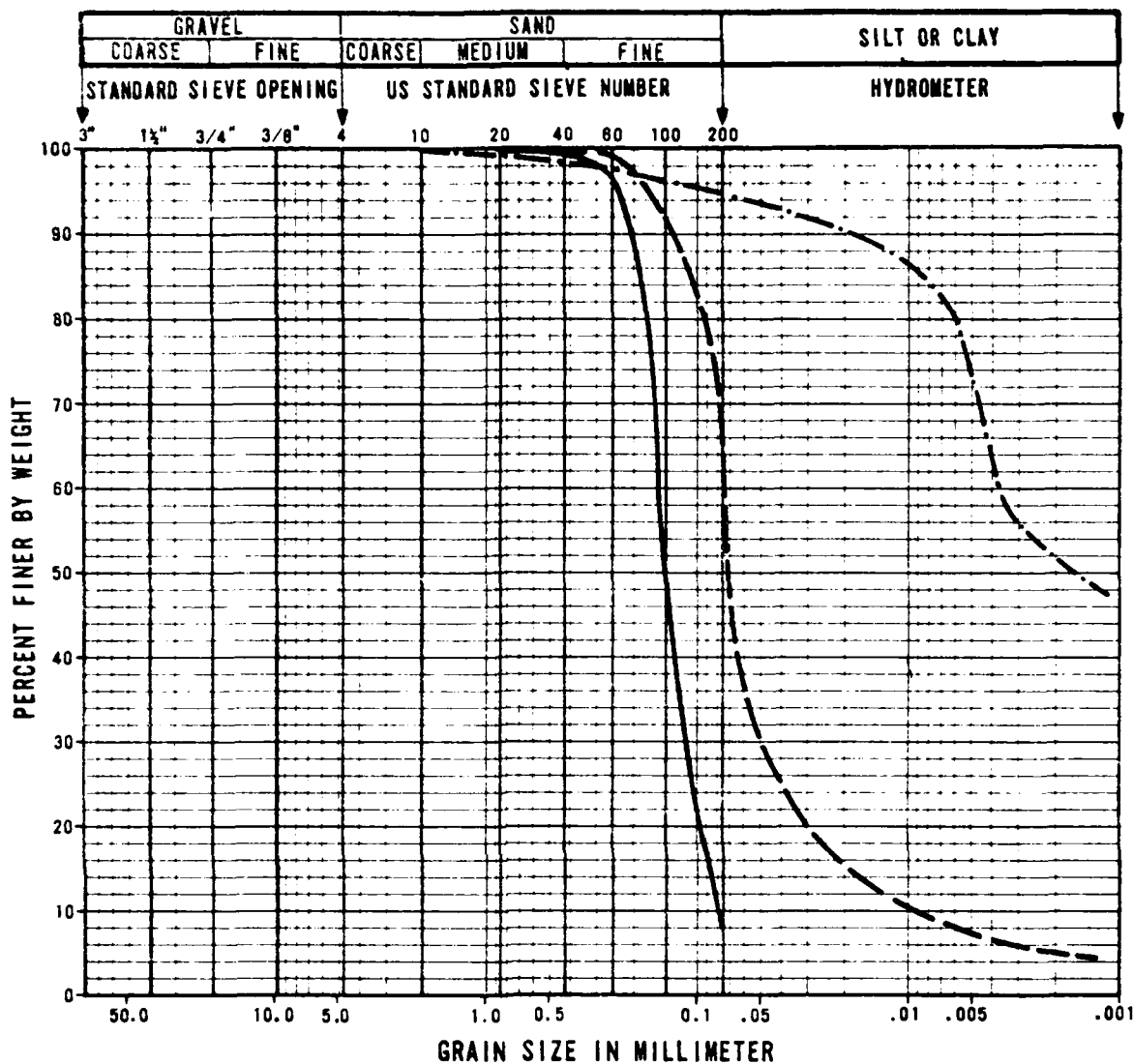
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-2	P-7	51.8-52.1	15.79-15.88	56	23	33	CH
- -	LD-C-2	P-8	60.0-62.0	18.29-18.90		NP		ML
- · -	LD-C-2	P-10	80.6-81.2	24.57-24.75				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-195

FUGRO NATIONAL, INC.



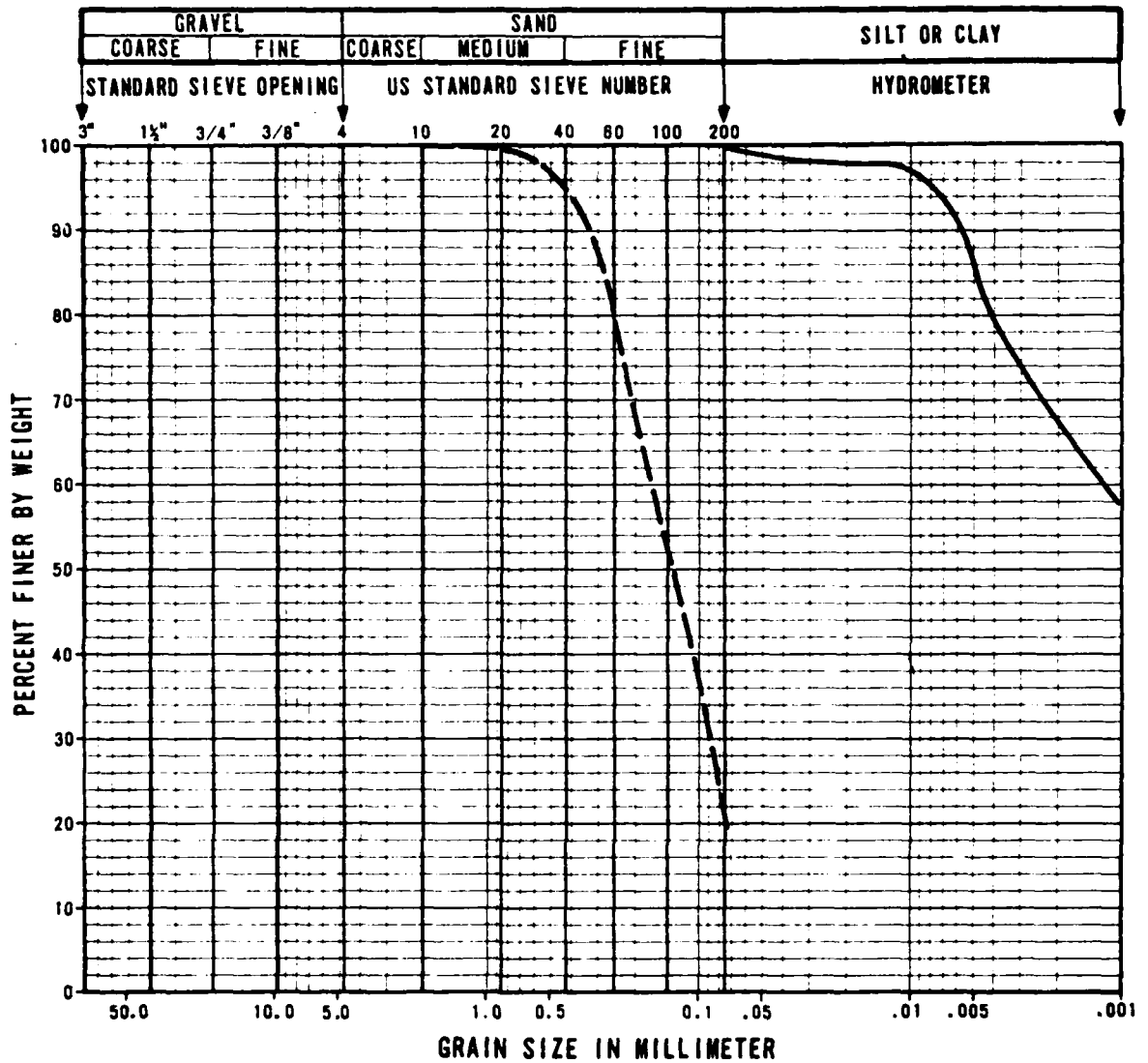
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-2	P-11	90.0-91.5	27.43-27.89				SP SM
- - -	LD-C-2	P-12	100.0-100.5	30.48-30.63		NP		ML
- · -	LD-C-2	P-14	150.0-151.4	45.72-46.15	71	26	45	CH

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS

FIGURE
C-196

FUGRO NATIONAL, INC.



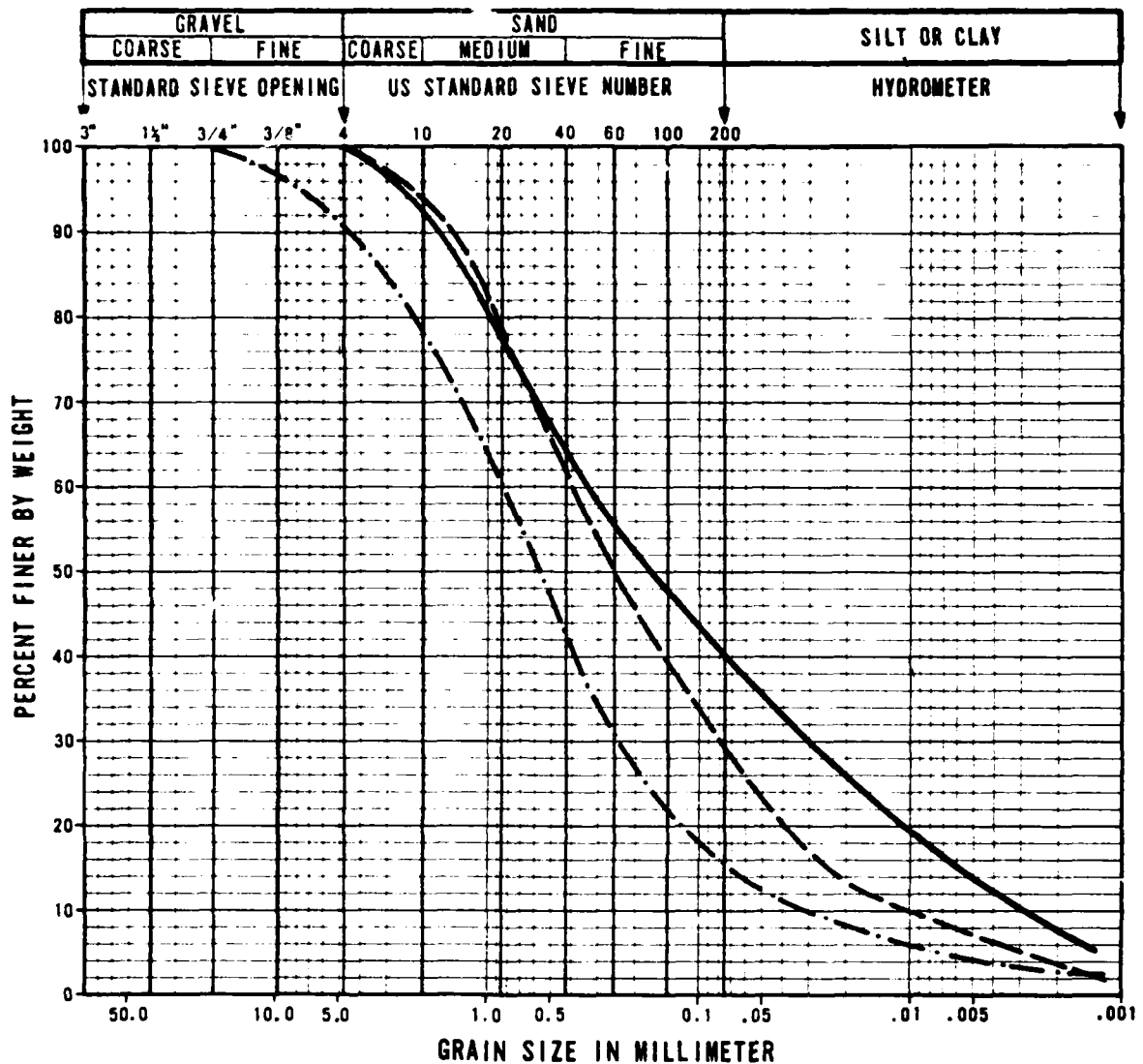
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-2	P-15	175.6-176.2	53.52-53.71	83	28	55	CH
- - -	LD-C-2	P-19	275.0-276.8	83.82-84.37				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-197

FUGRO NATIONAL, INC.



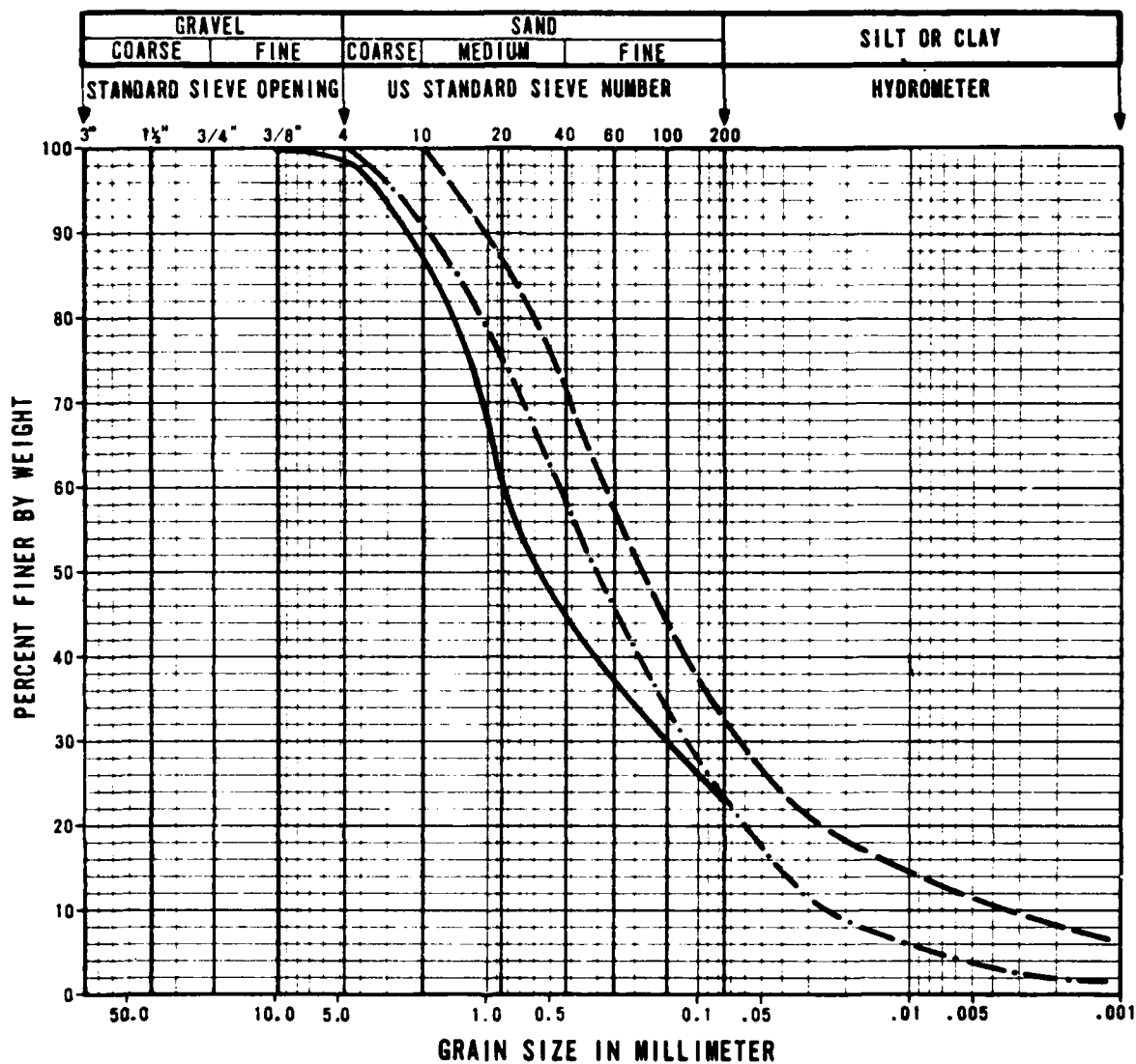
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-3	P-1	5.0-5.6	1.52-1.71				SC
- -	LD-C-3	P-2	10.0-10.6	3.05-3.23				SM
- · -	LD-C-3	P-2	11.8-12.0	3.60-3.66		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-198

FUGRO NATIONAL, INC.



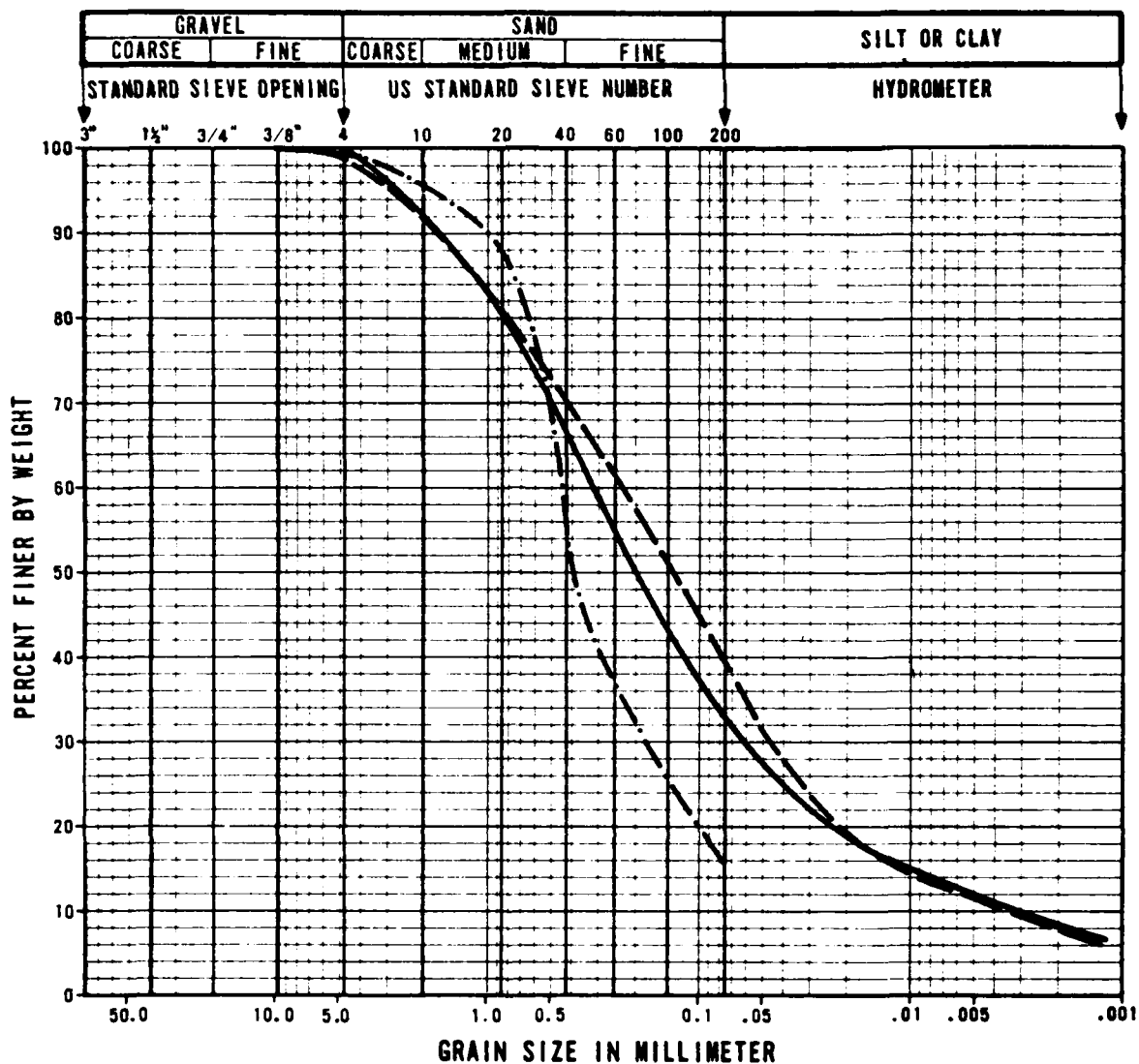
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-3	P-4	21.0-22.0	6.40-6.71		NP		SM
- - -	LD-C-3	P-5	30.0-30.6	9.14-9.33				SM
- · -	LD-C-3	P-8	60.0-62.3	18.29-18.99		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-199

FUGRO NATIONAL, INC.



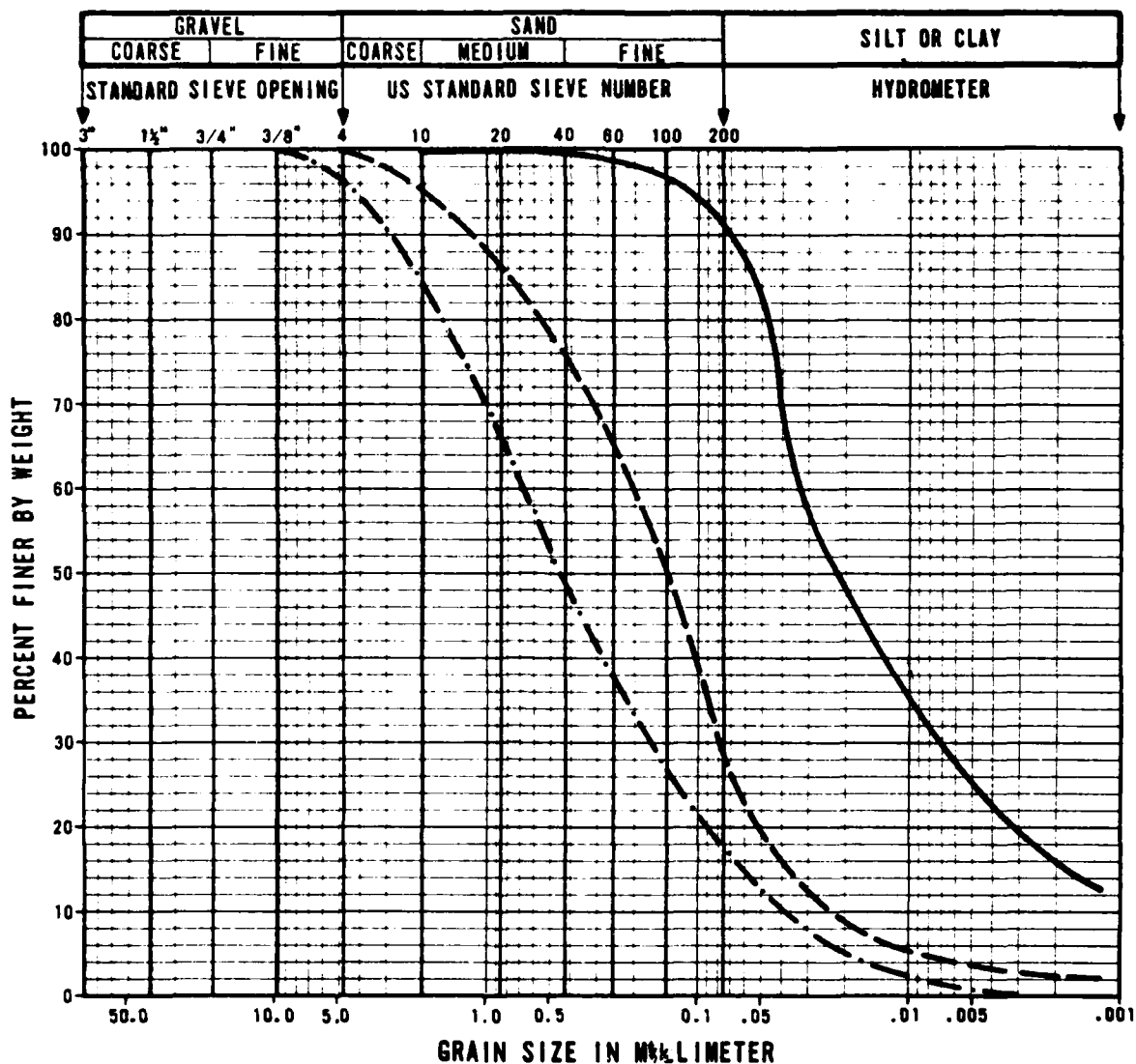
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-3	P-10	80.0-80.6	24.38-24.57				SC
- -	LD-C-3	P-11	90.0-90.6	27.43-27.61				SC
- · -	LD-C-3	P-12	100.0-100.8	30.48-30.72		NP		SM

GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-200

FUGRO NATIONAL, INC.



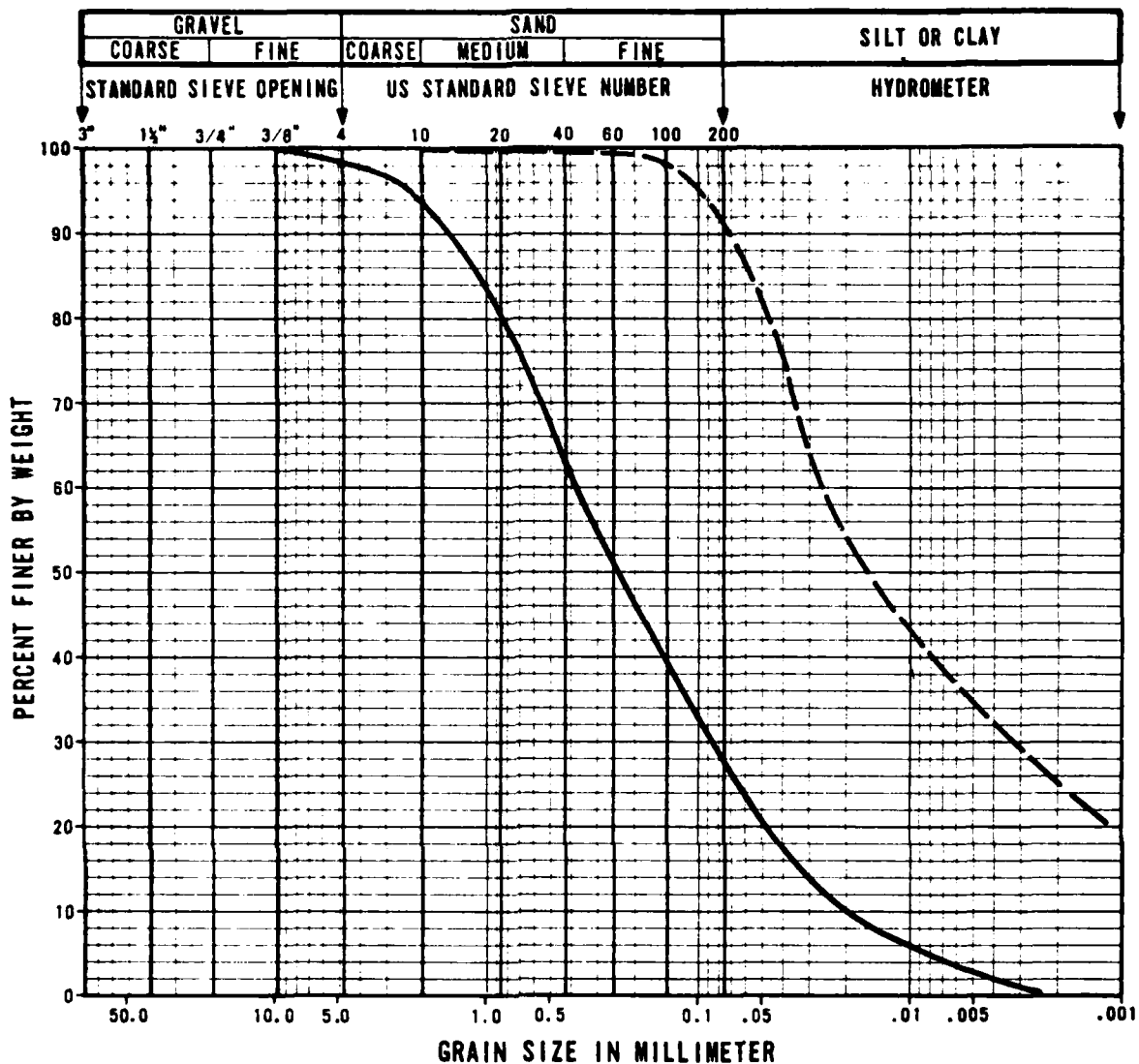
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-3	P-14	151.2-151.8	46.09-46.27	34	18	16	CL
- - -	LD-C-3	P-15	175.0-175.4	53.34-53.46		NP		SM
- · -	LD-C-3	P-16	200.0-200.4	60.96-61.08				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-201

FUGRO NATIONAL, INC.

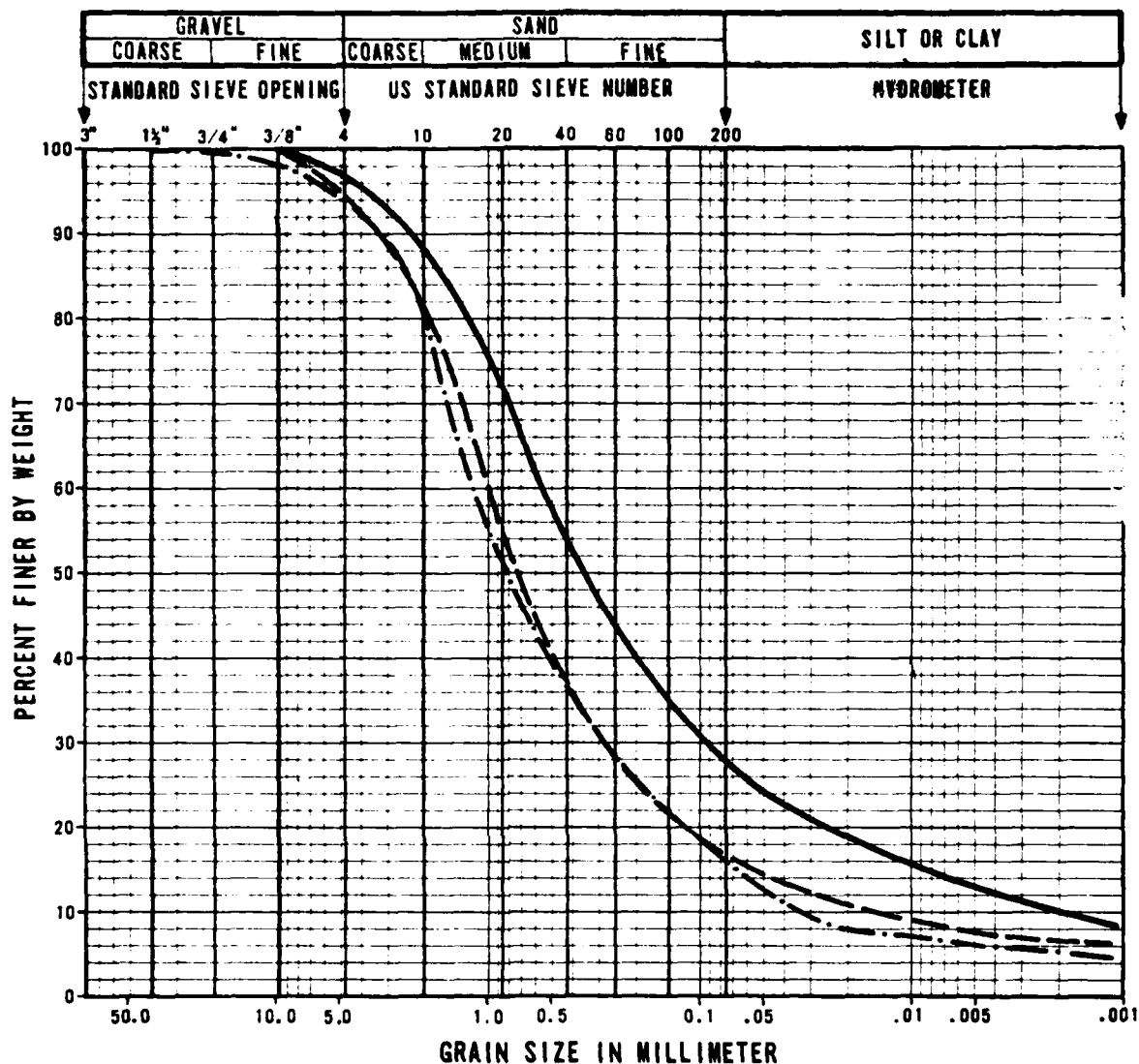


GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-202

FUGRO NATIONAL, INC.



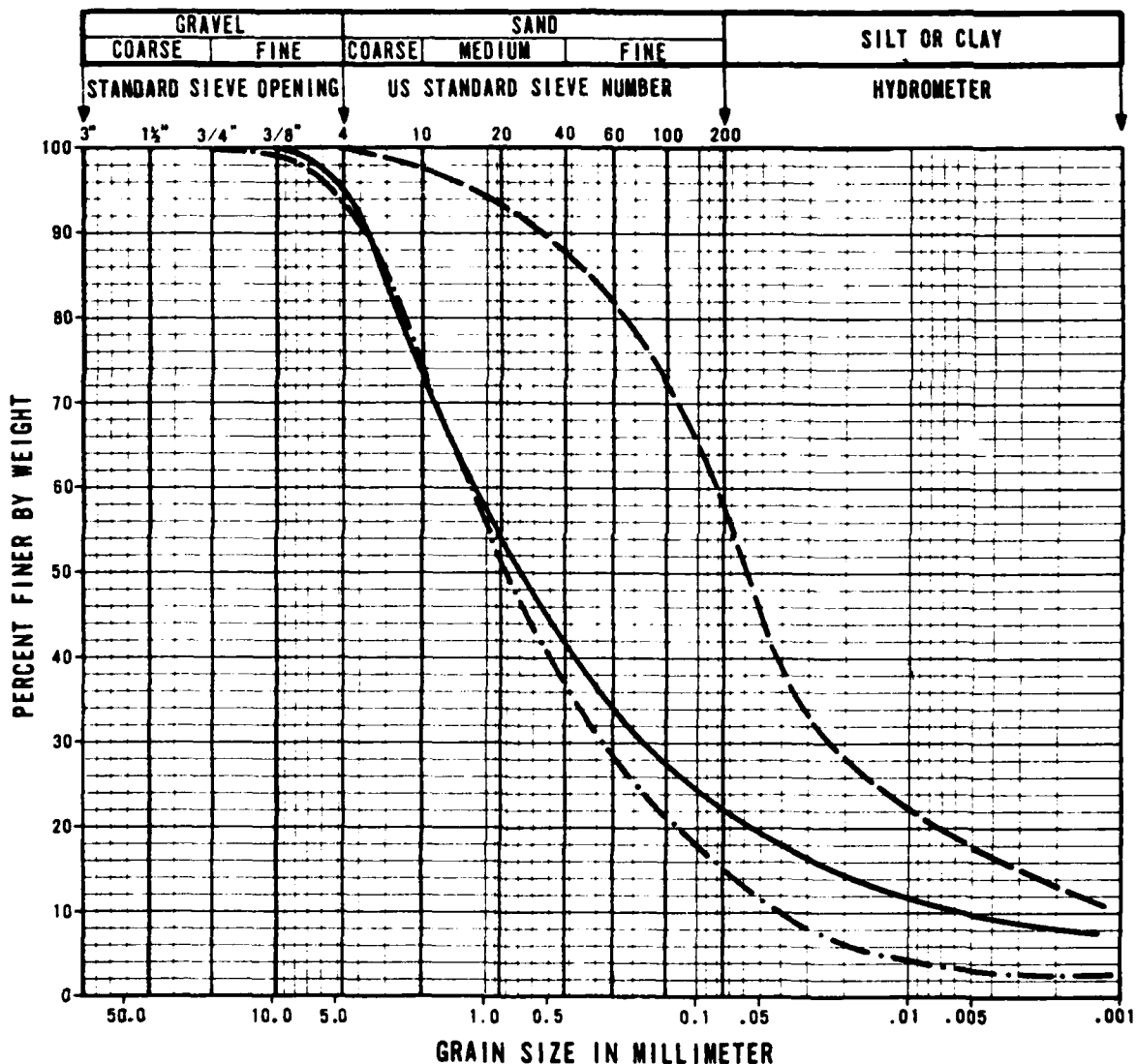
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-4	P-1	5.0-5.6	1.52-1.71				SC
- -	LD-C-4	P-2	10.6-11.2	3.23-3.41	38	19	19	SC
- · -	LD-C-4	P-4	20.0-20.6	6.10-6.28				SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-203

UGRO NATIONAL, INC.



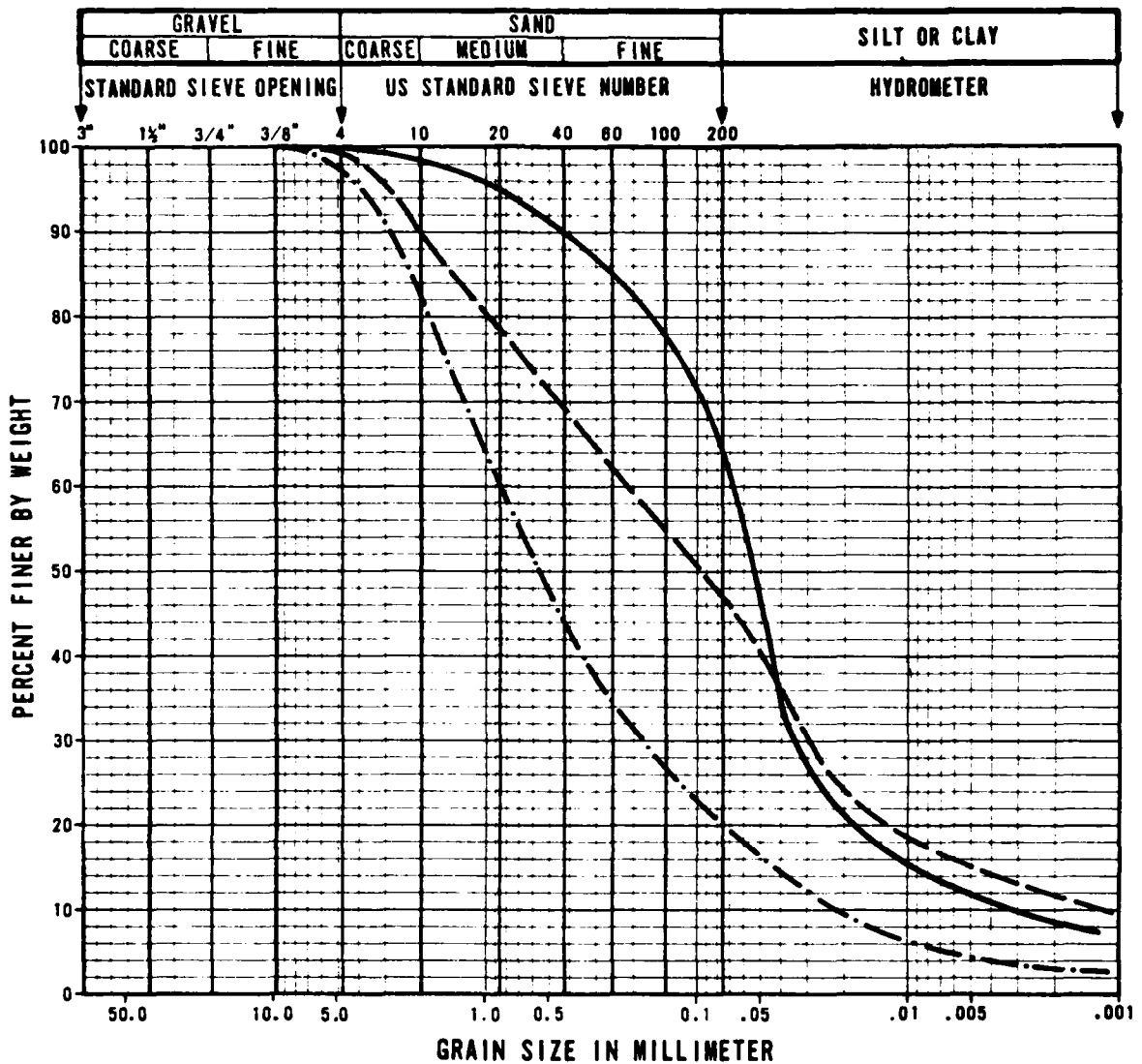
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-4	P-5	30.6-31.2	9.33-9.51	33	19	14	SC
- - -	LD-C-4	P-8	60.0-60.6	18.29-18.47	35	22	13	CL
- · -	LD-C-4	P-9	70.0-70.6	21.34-21.52				SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-204

FUGRO NATIONAL, INC.



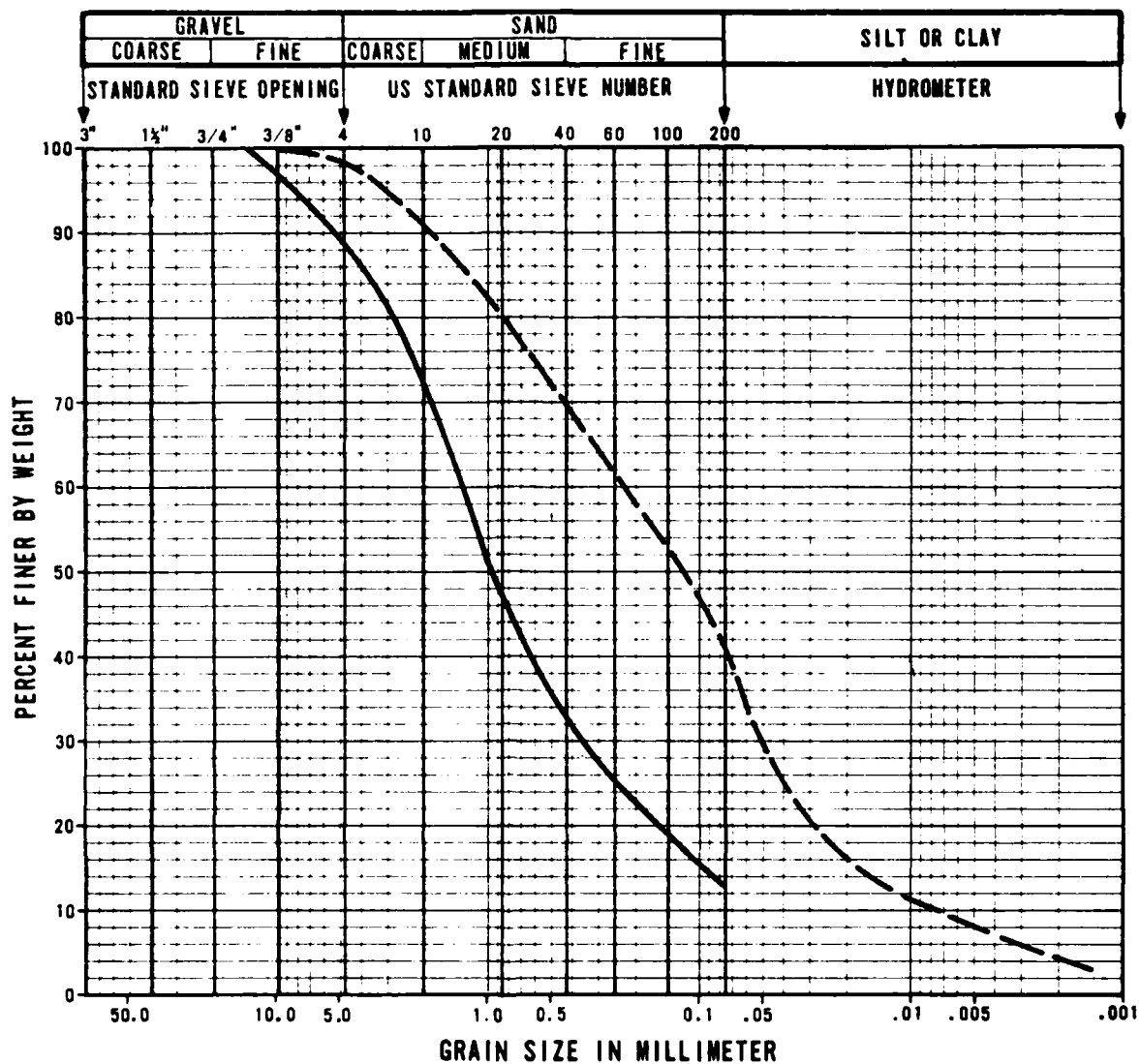
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-4	P-10	80.0-80.6	24.38-24.57	33	24	9	ML
- - -	LD-C-4	P-11	90.0-90.6	27.43-27.61				SC
- · -	LD-C-4	P-13	125.0-125.6	38.10-38.28		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-205

FUGRO NATIONAL, INC.



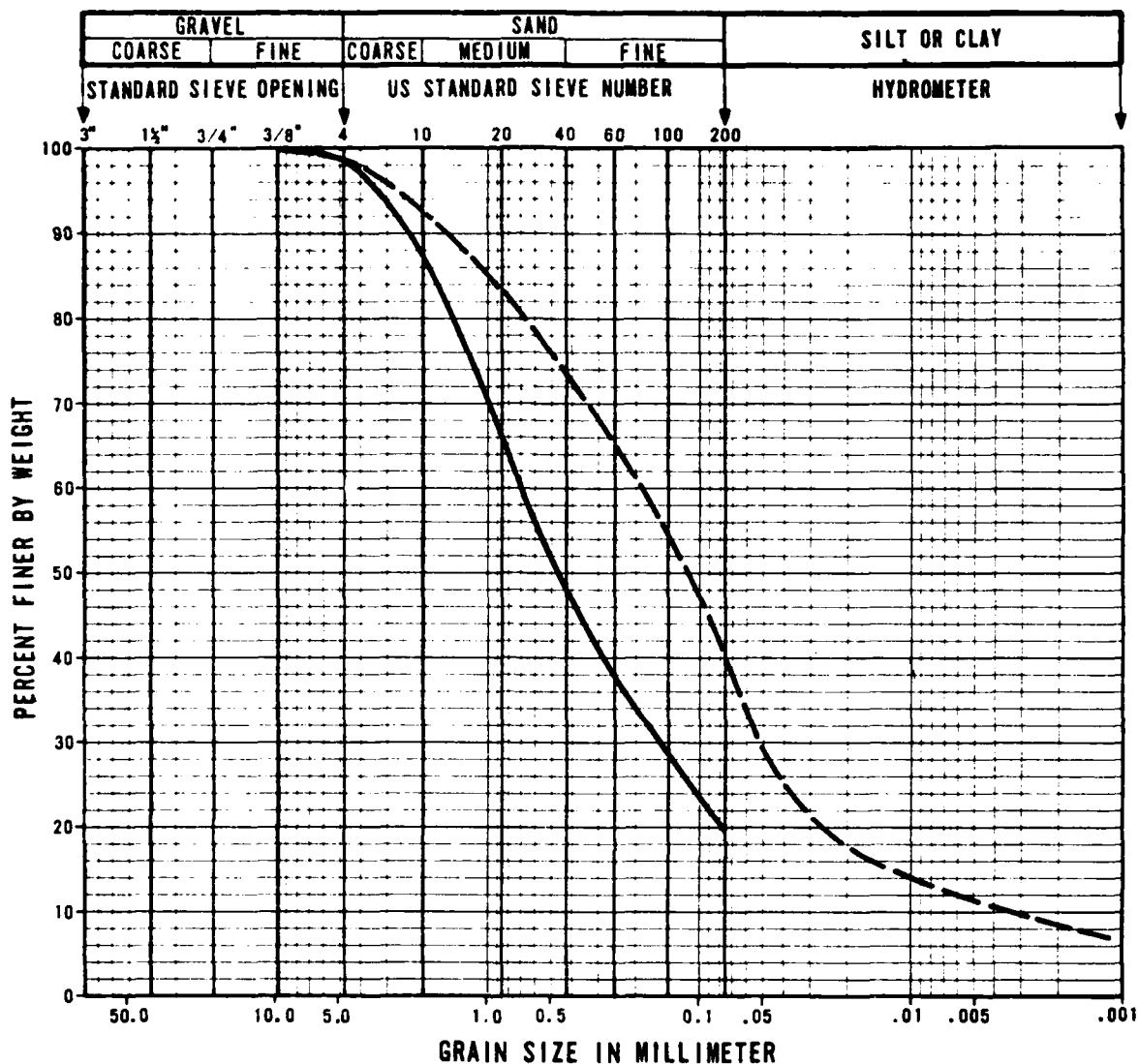
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-4	P-14	151.0-152.0	46.02-46.33		NP		SM
- -	LD-C-4	P-16	200.0-200.4	60.96-61.08		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-206

FUGRO NATIONAL, INC.



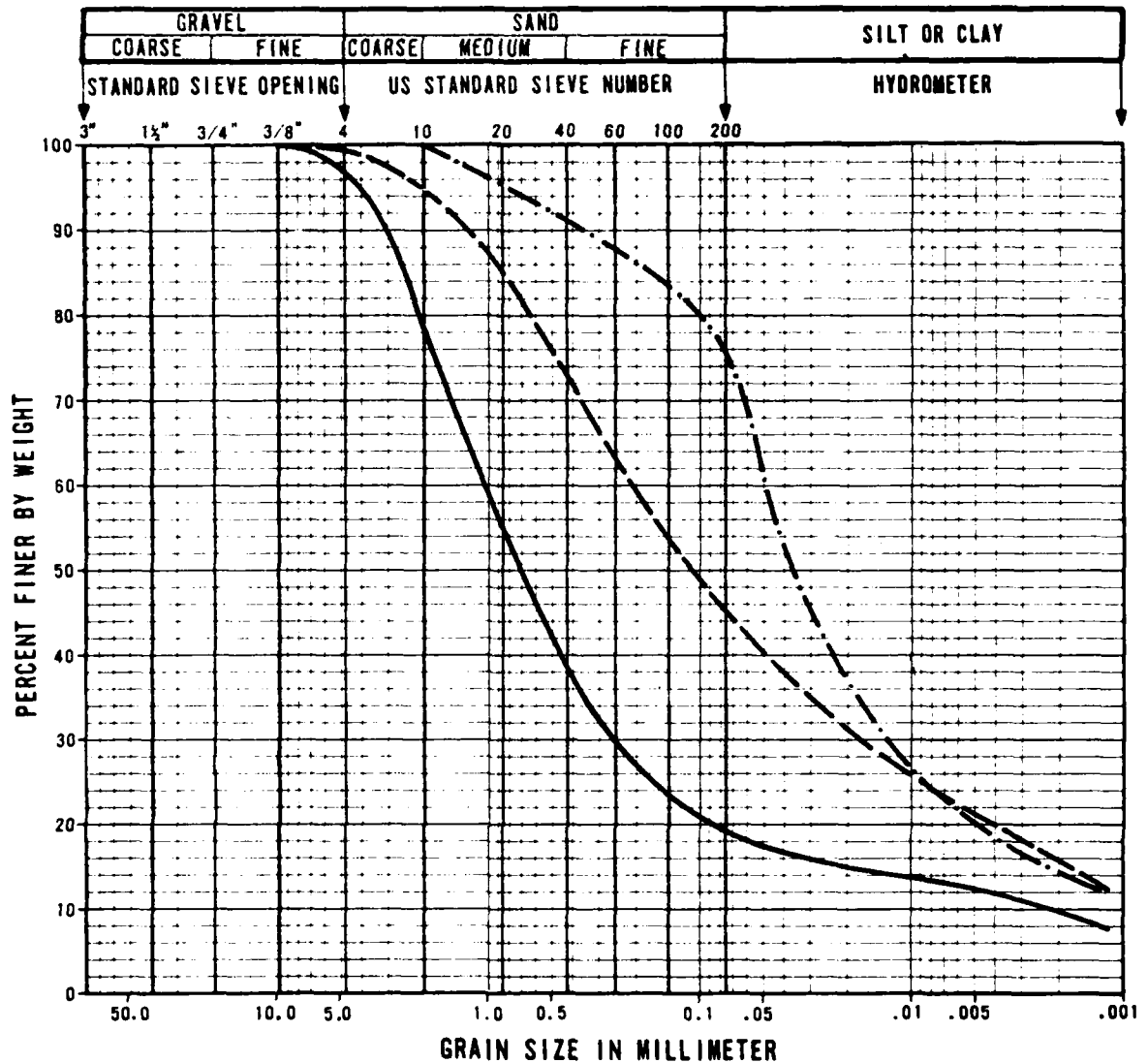
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-4	P-17	250.0-250.5	76.20-76.35				SM
- - -	LD-C-4	P-18	275.0-275.2	83.82-83.88	31	24	7	SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-207

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-5	P-1	6.2-6.8	1.89-2.07	45	19	26	SC
- - -	LD-C-5	P-3	15.0-15.6	4.57-4.75	40	20	20	SC
- · - · -	LD-C-5	P-4	20.0-20.6	6.10-6.28	34	20	14	CL

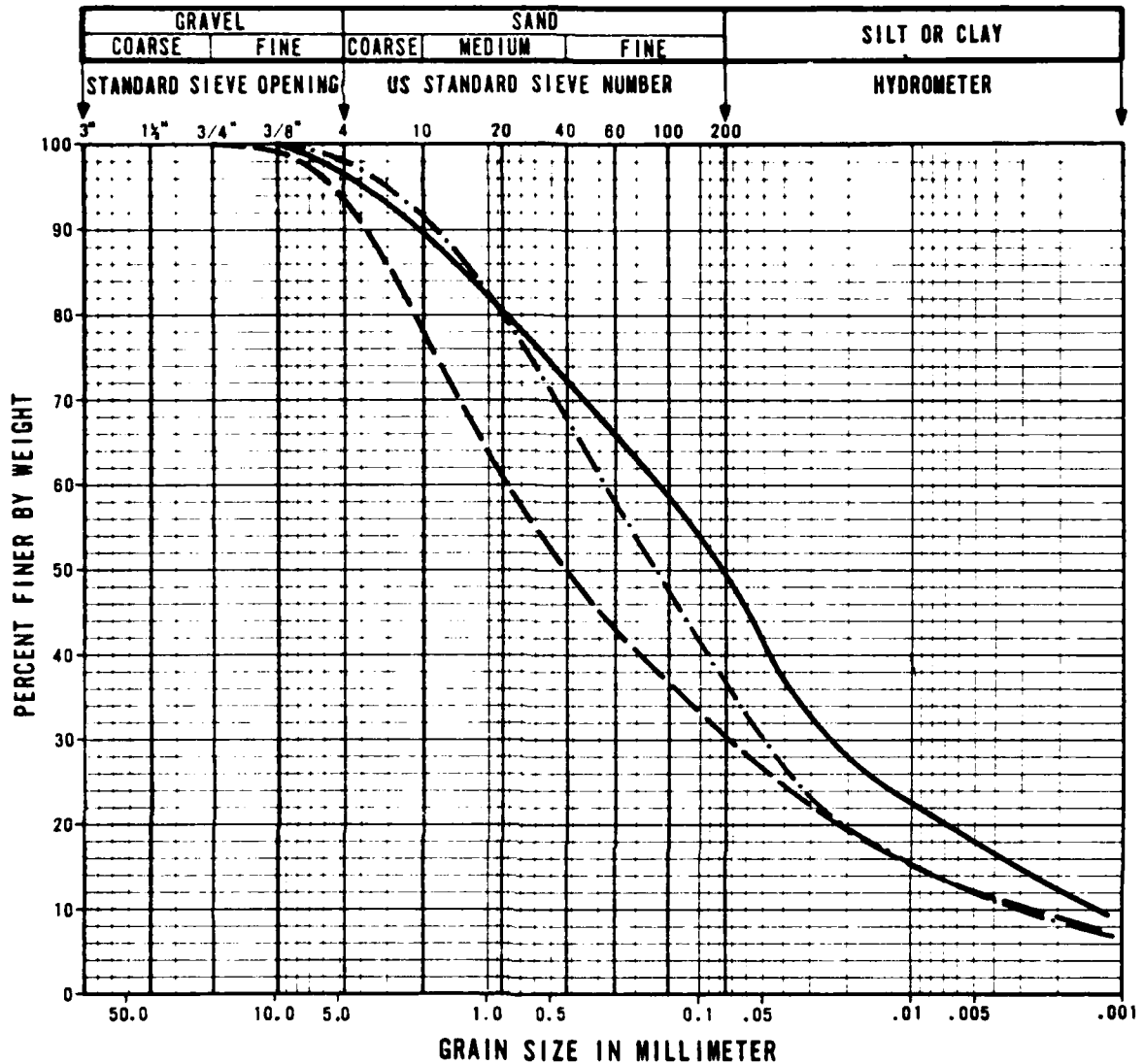
GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-208

FUGRO NATIONAL, INC.



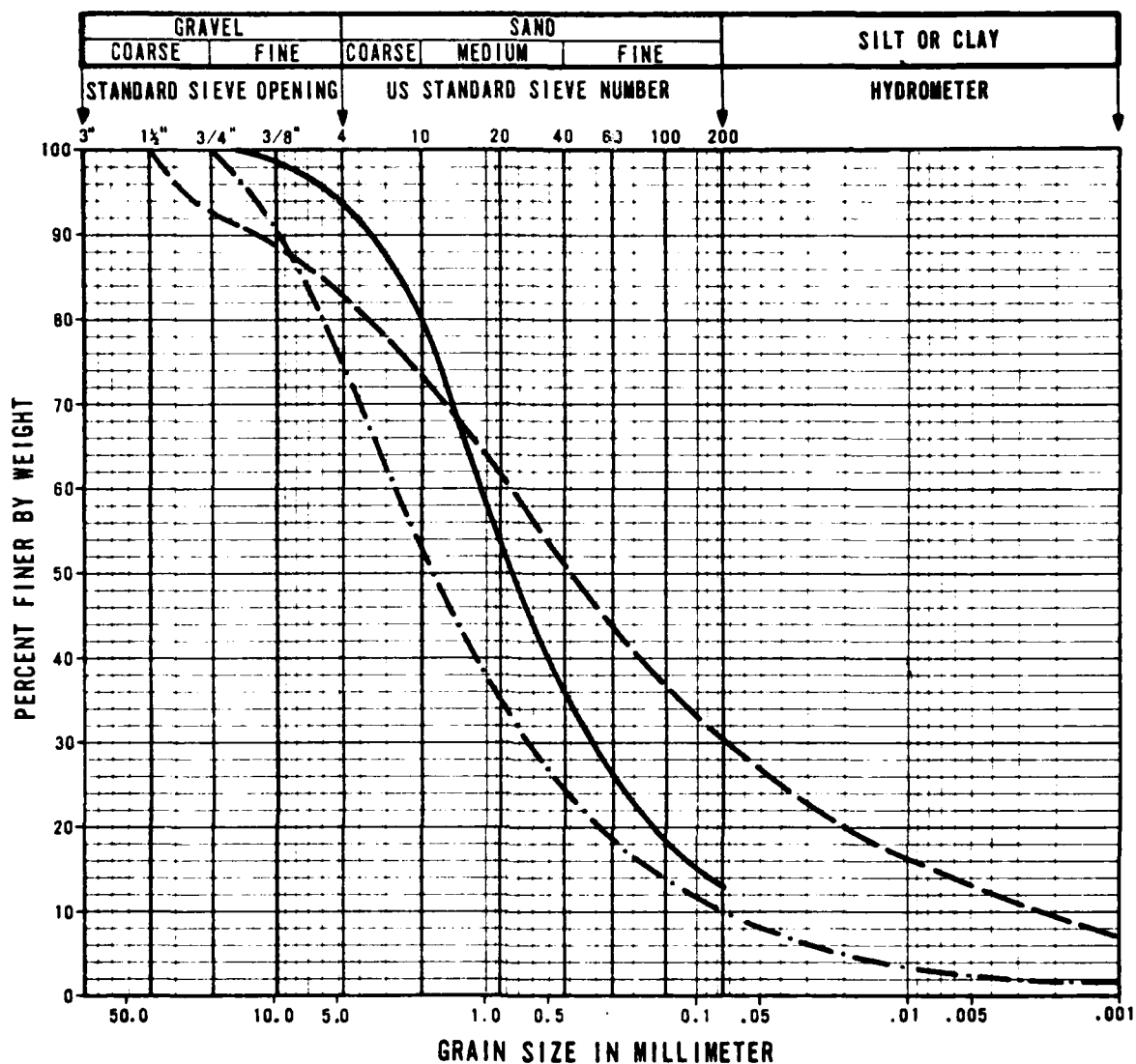
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-5	P-6	40.0-40.6	12.19-12.37	33	19	14	SC
- - -	LD-C-5	P-7	50.0-50.8	15.24-15.48	36	19	17	SC
- · -	LD-C-5	P-8	60.6-61.2	18.47-18.65	29	18	11	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-209

FUGRO NATIONAL, INC.



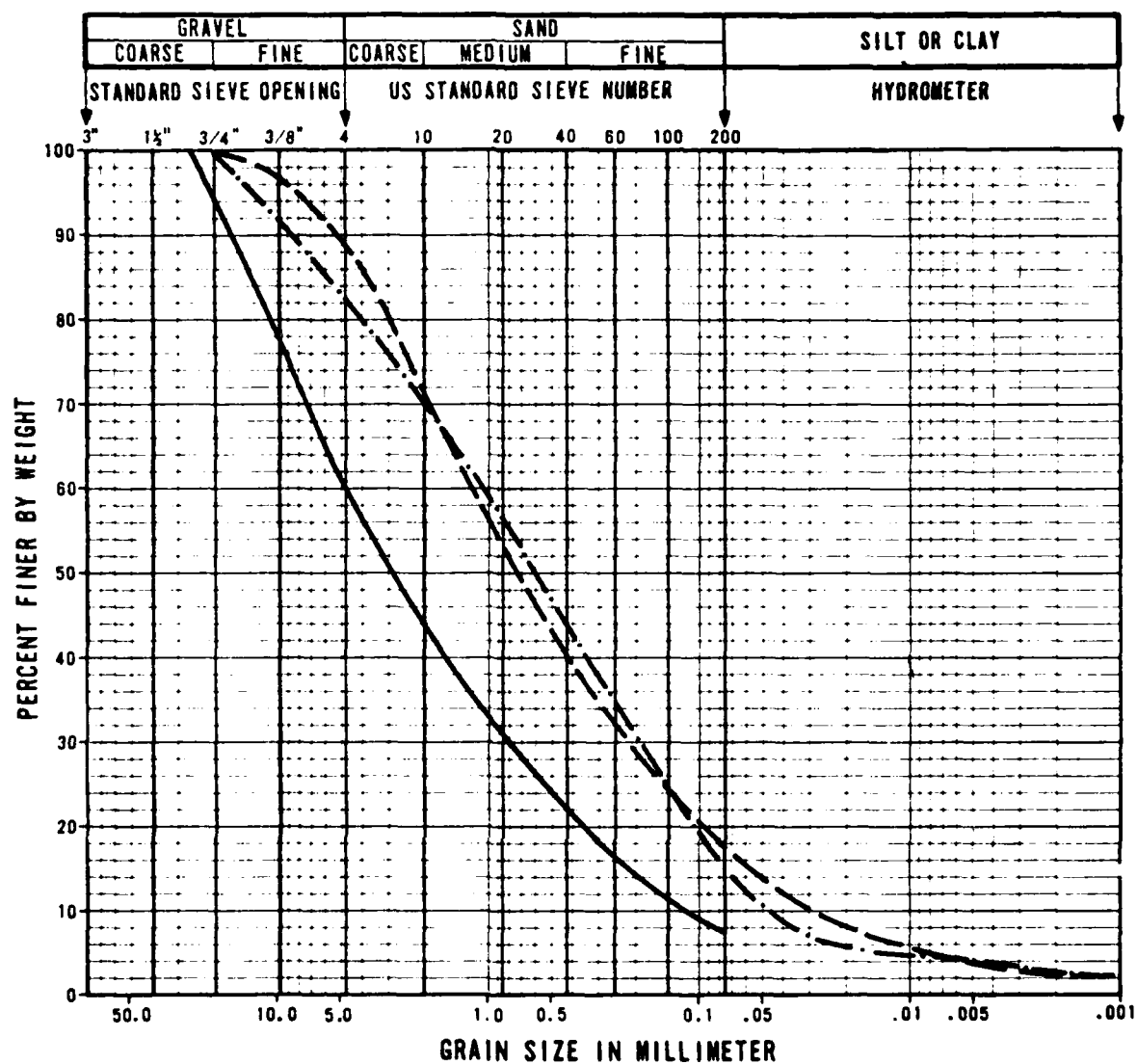
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-5	P-9	70.0-71.8	21.34-21.88		NP		SM
- - -	LD-C-5	P-10	80.0-80.6	24.38-24.57				SC
- · -	LD-C-5	P-13	125.0-125.5	38.10-38.25				SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-210

FUGRO NATIONAL, INC.



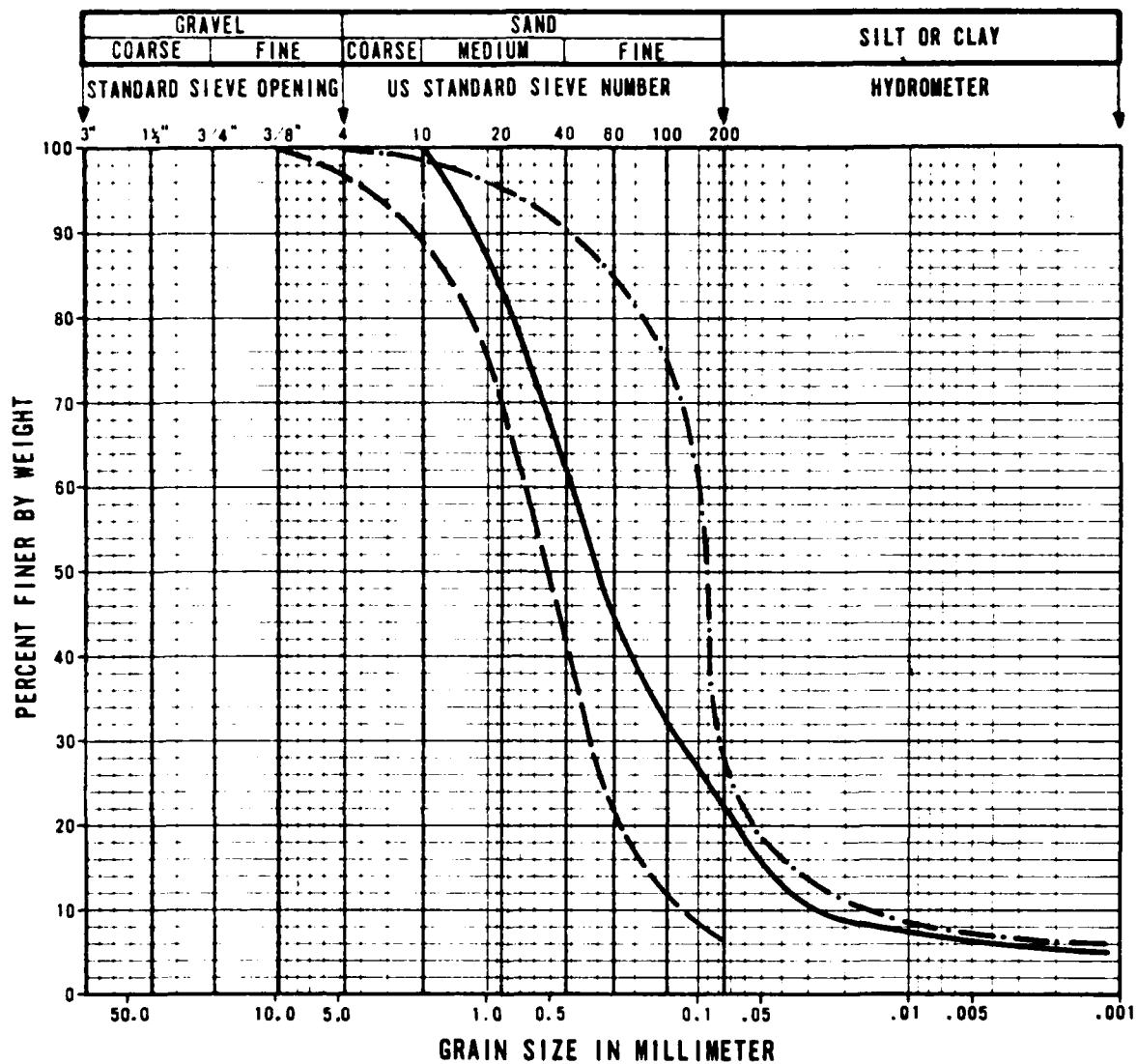
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-5	P-15	170.0-175.8	51.82-53.58		NP		SP/SM
- -	LD-C-5	P-16	200.0-200.6	60.96-61.14				SM
- · -	LD-C-5	P-17	225.0-225.3	68.58-68.67		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-211

FUGRO NATIONAL, INC.



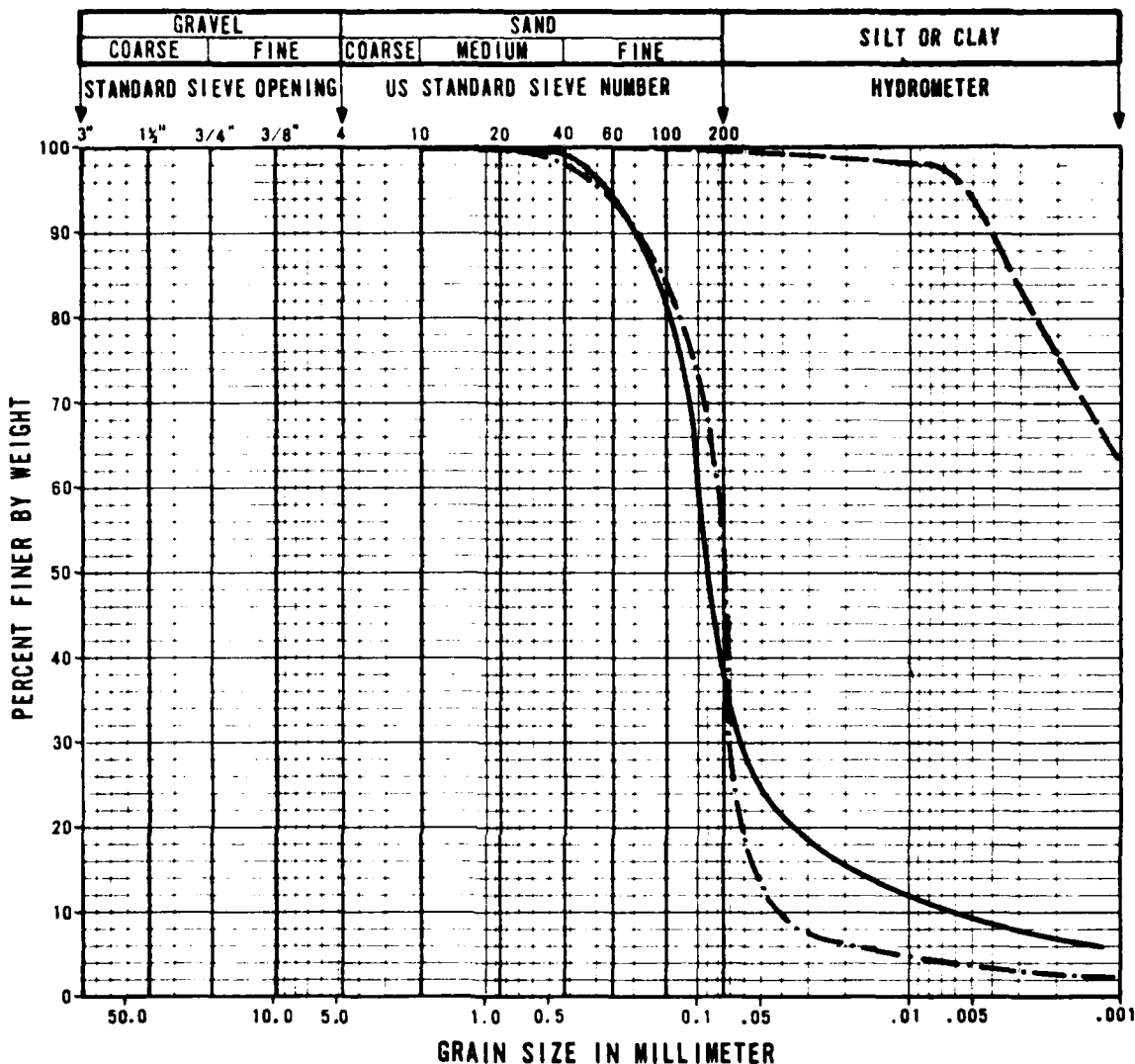
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-6	P-2	10.0-10.6	3.05-3.23	24	20	4	SC SM
- - -	LD-C-6	P-3	20.0-20.2	6.10-6.16				SP SM
- · -	LD-C-6	P-4	30.0-30.6	9.14-9.33		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-212

FUGRO NATIONAL, INC.



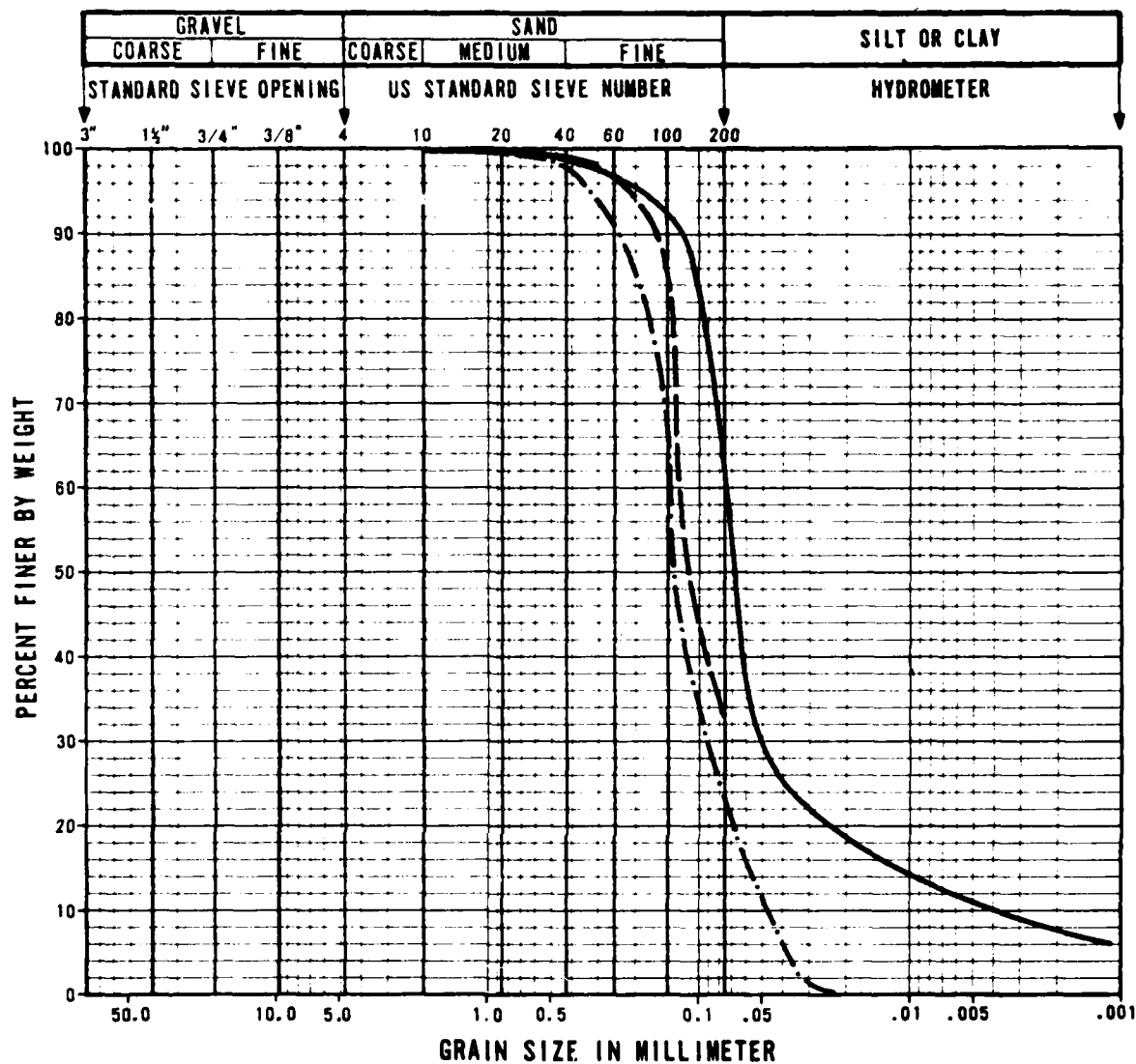
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-C-6	P-7	60.0-61.4	18.29-18.71		NP		SM
- -	LD-C-6	P-9	80.6-81.6	24.57-24.87	69	25	44	CH
- · -	LD-C-6	P-10	90.0-90.6	27.43-27.61				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-213

FUGRO NATIONAL, INC.

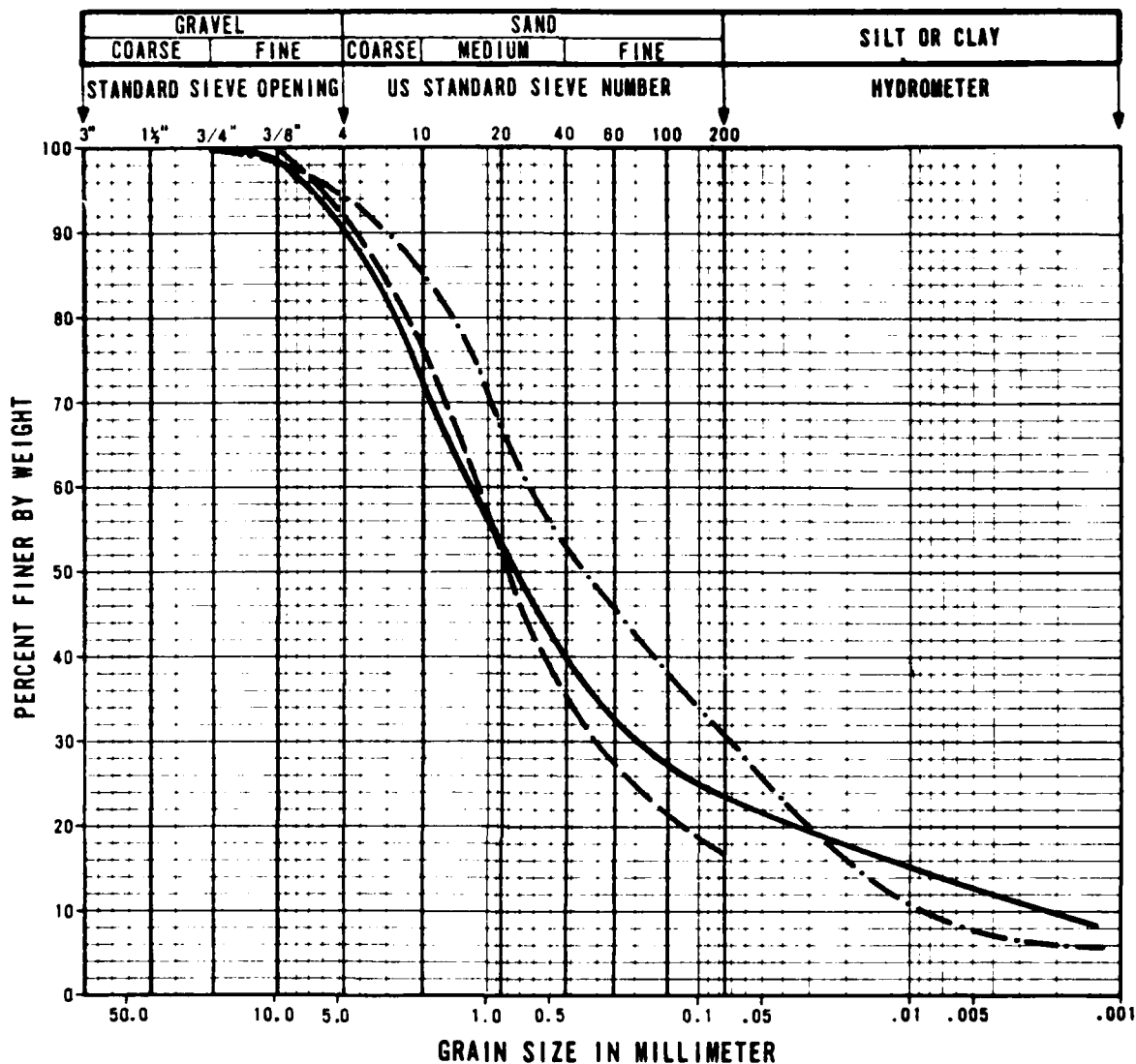


GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-214

UGRO NATIONAL, INC.



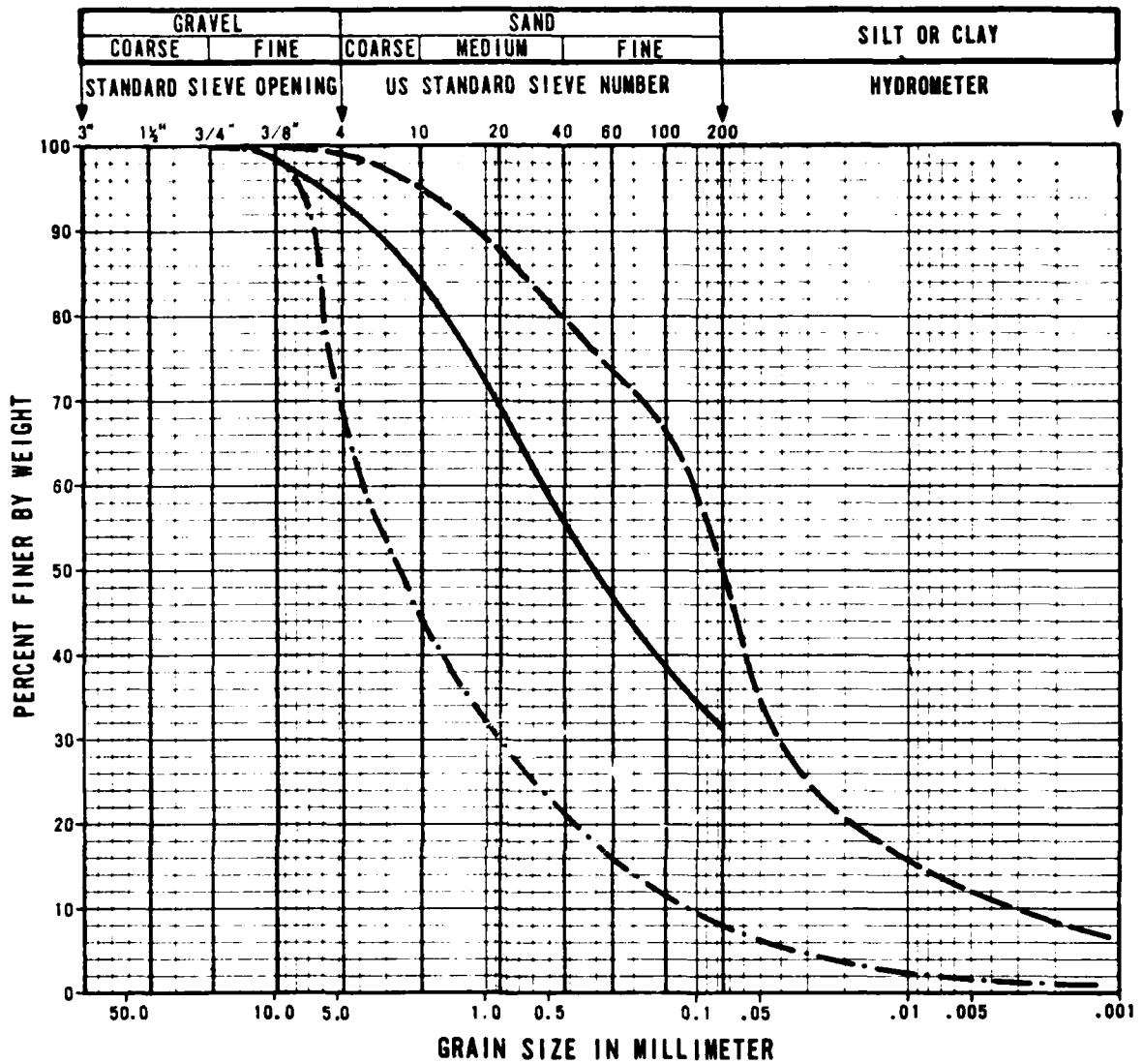
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-1	P-1	6.6-7.3	2.01-2.23	44	19	25	SC
- - -	LD-D-1	P-3	15.0-17.3	4.57-5.27				SC
- · -	LD-D-1	P-4	21.6-22.5	6.58-6.86	42	25	17	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-215

FUGRO NATIONAL, INC.



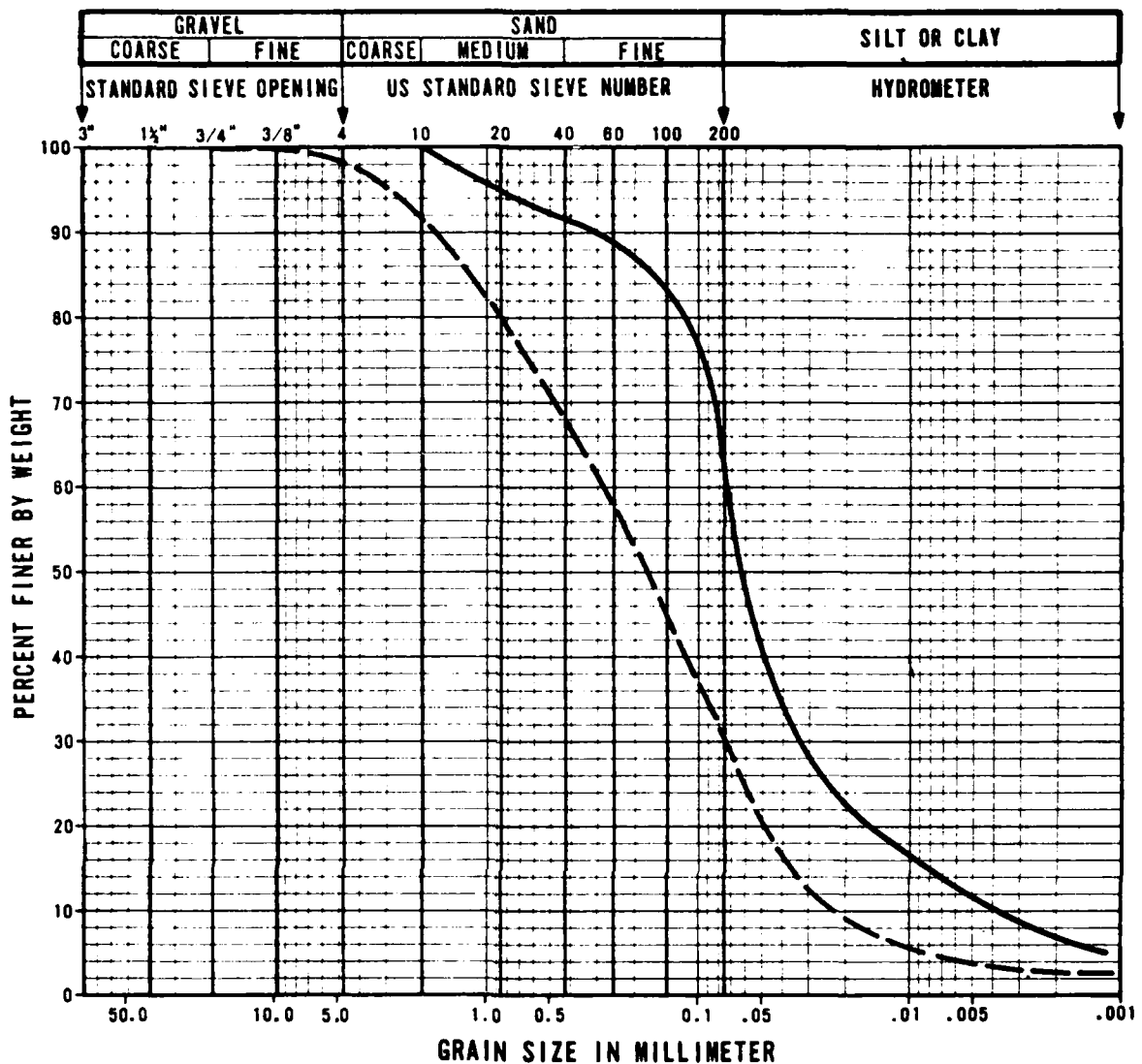
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-	P-6	40.0-41.6	12.19-12.68				SM
- - -	LD-D-		60.1-60.7	18.32-18.51	37	20	17	SC
- · -	LD-D-1	1-9	70.0-71.9	21.34-21.92		NP		SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-216

FUGRO NATIONAL, INC.



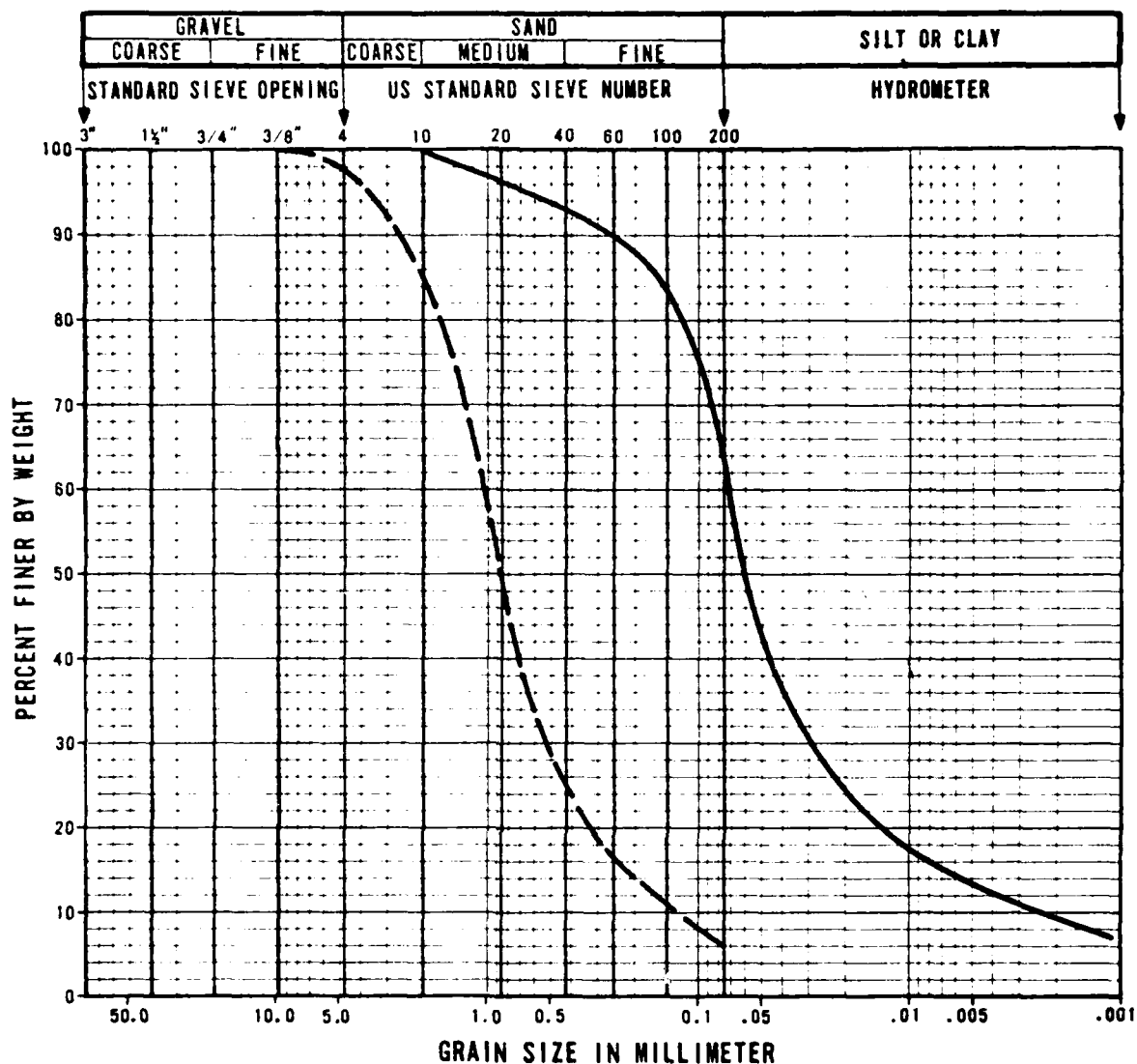
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-1	P-11	90.0-90.6	27.43-27.61	28	18	10	CL
- - -	LD-D-1	P-12	100.0-101.6	30.48-30.97				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-217

FUGRO NATIONAL, INC.

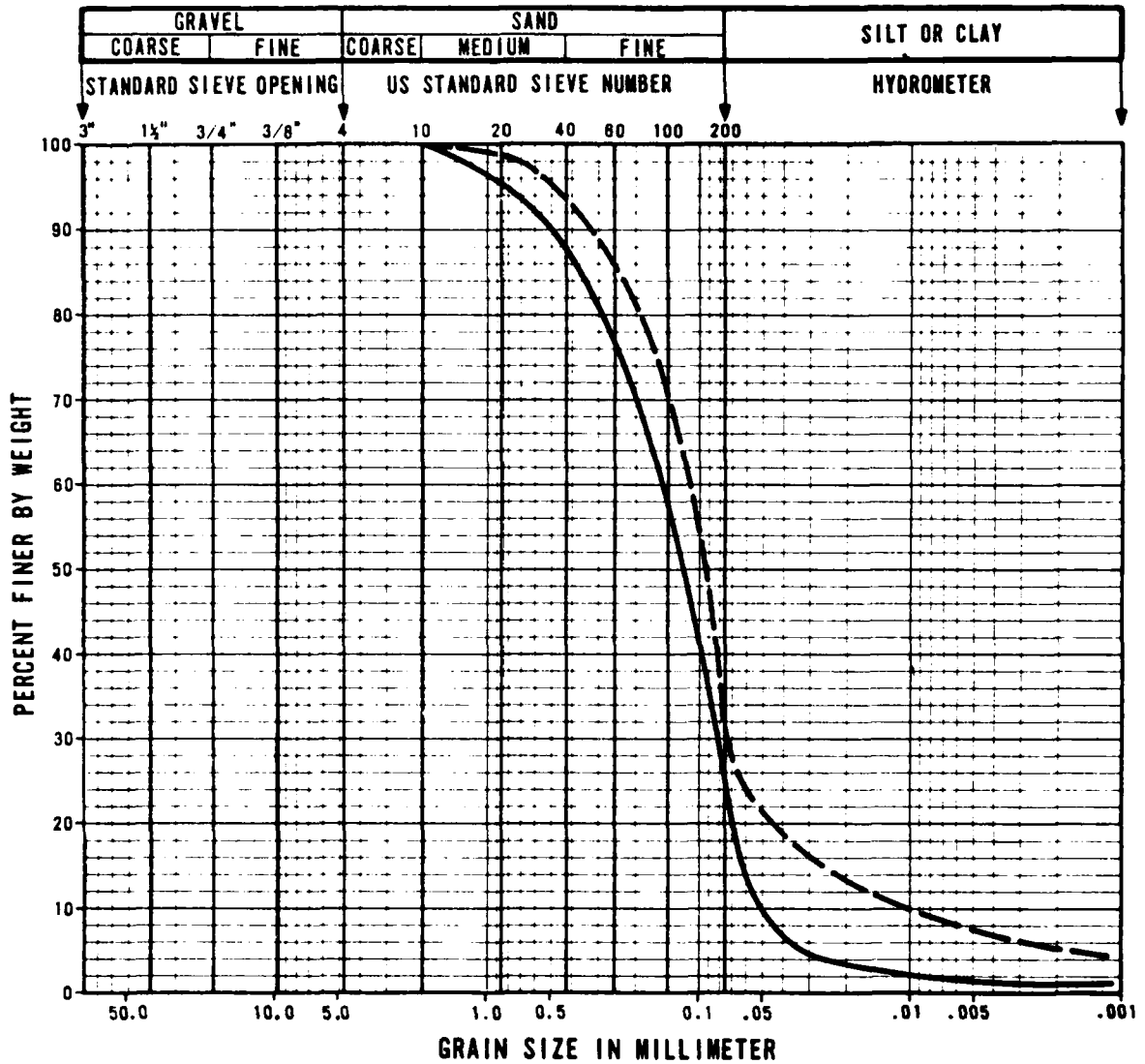


GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-218

FUGRO NATIONAL, INC.



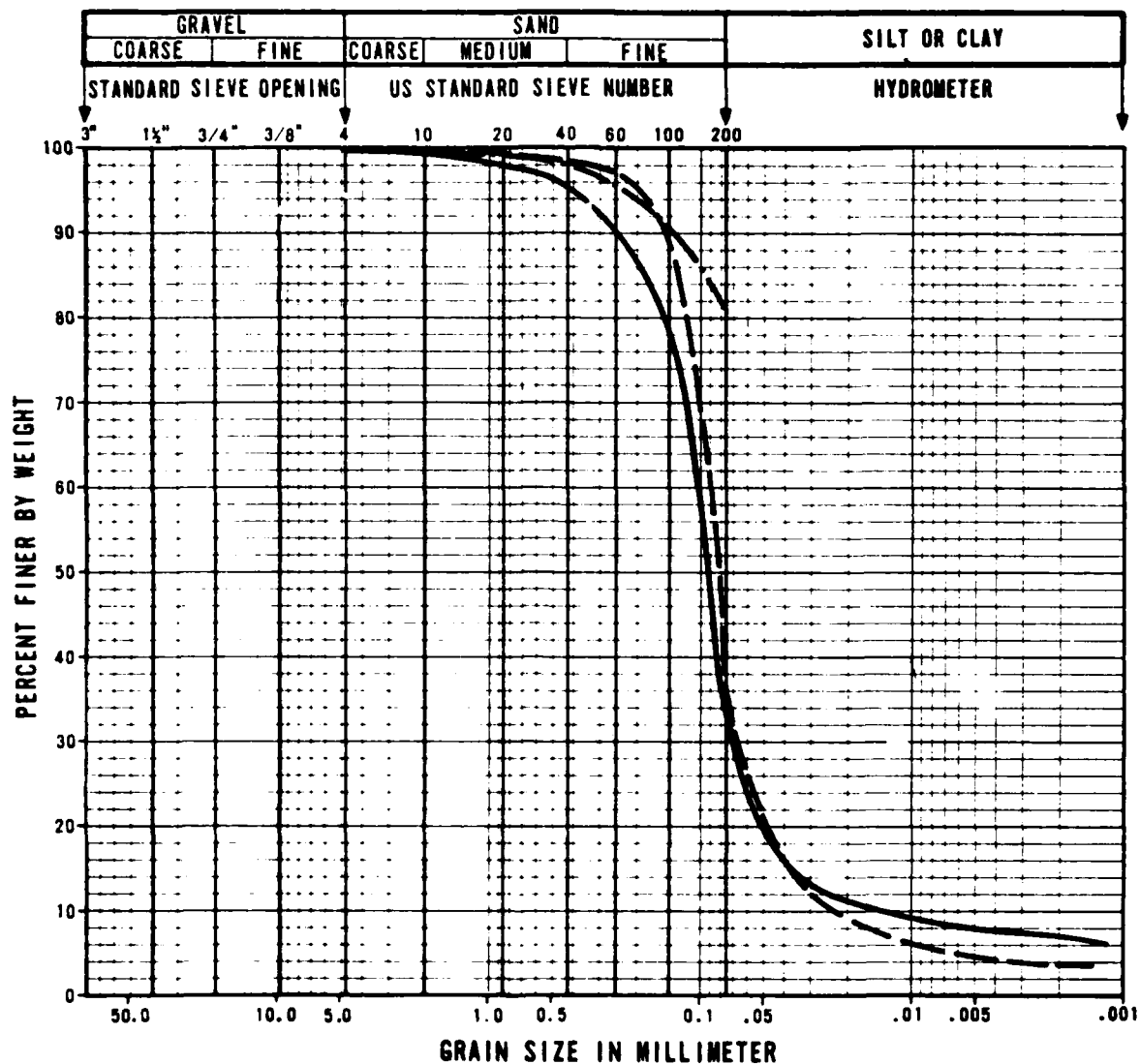
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-1	P-17	226.6-227.5	69.07-69.34				SM
- - -	LD-D-1	P-18	250.0-250.6	76.20-76.38		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-219

FUGRO NATIONAL, INC.



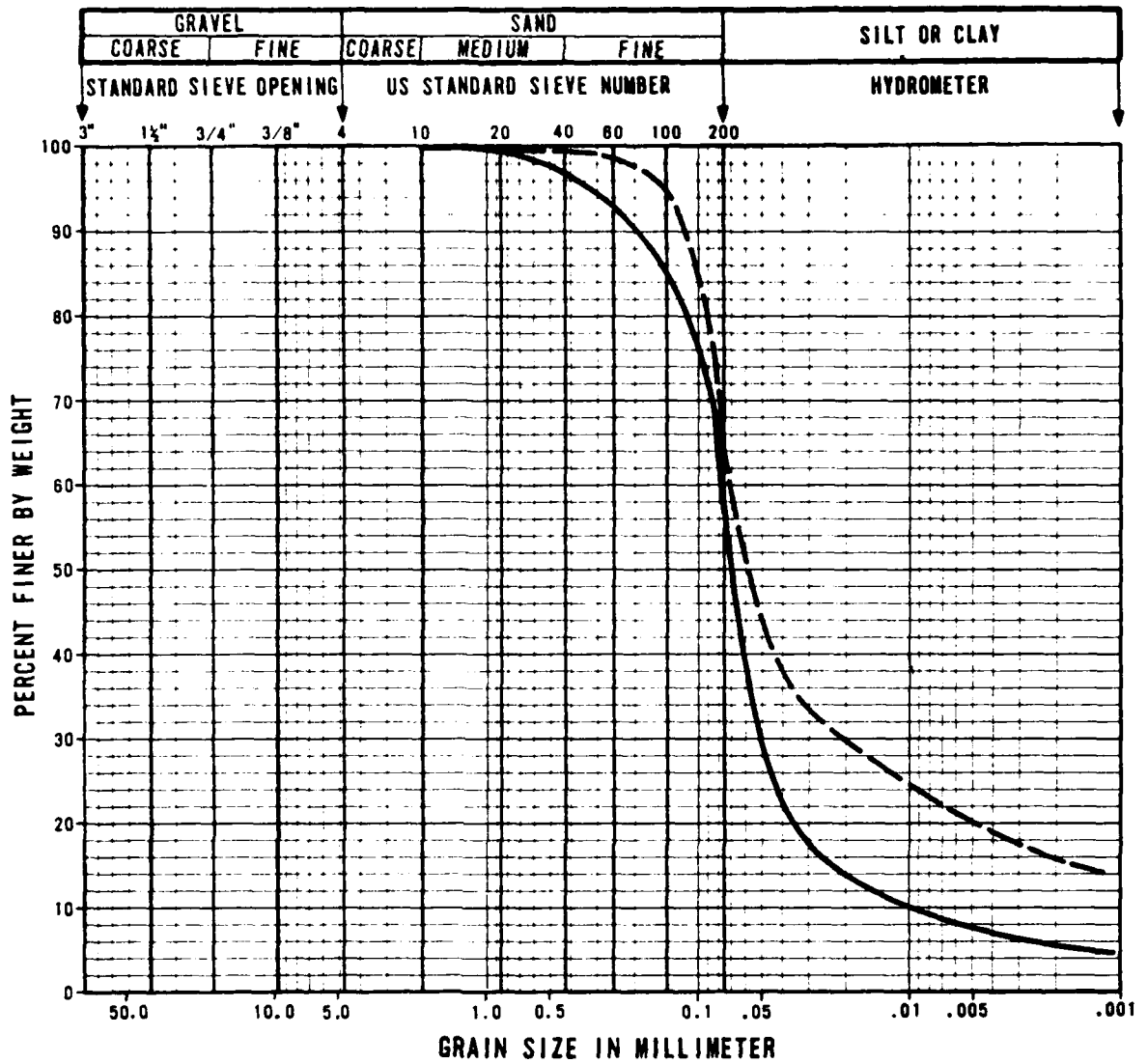
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-0-1	P-18	250.0-250.6	76.20-76.38		NP		SM
---	LD-0-1	P-19	275.0-275.6	83.82-84.00		NP		SM
- - -	LD-0-1	P-19	276.6-277.5	84.31-84.58				NL

GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
C-220

FUGRO NATIONAL, INC.



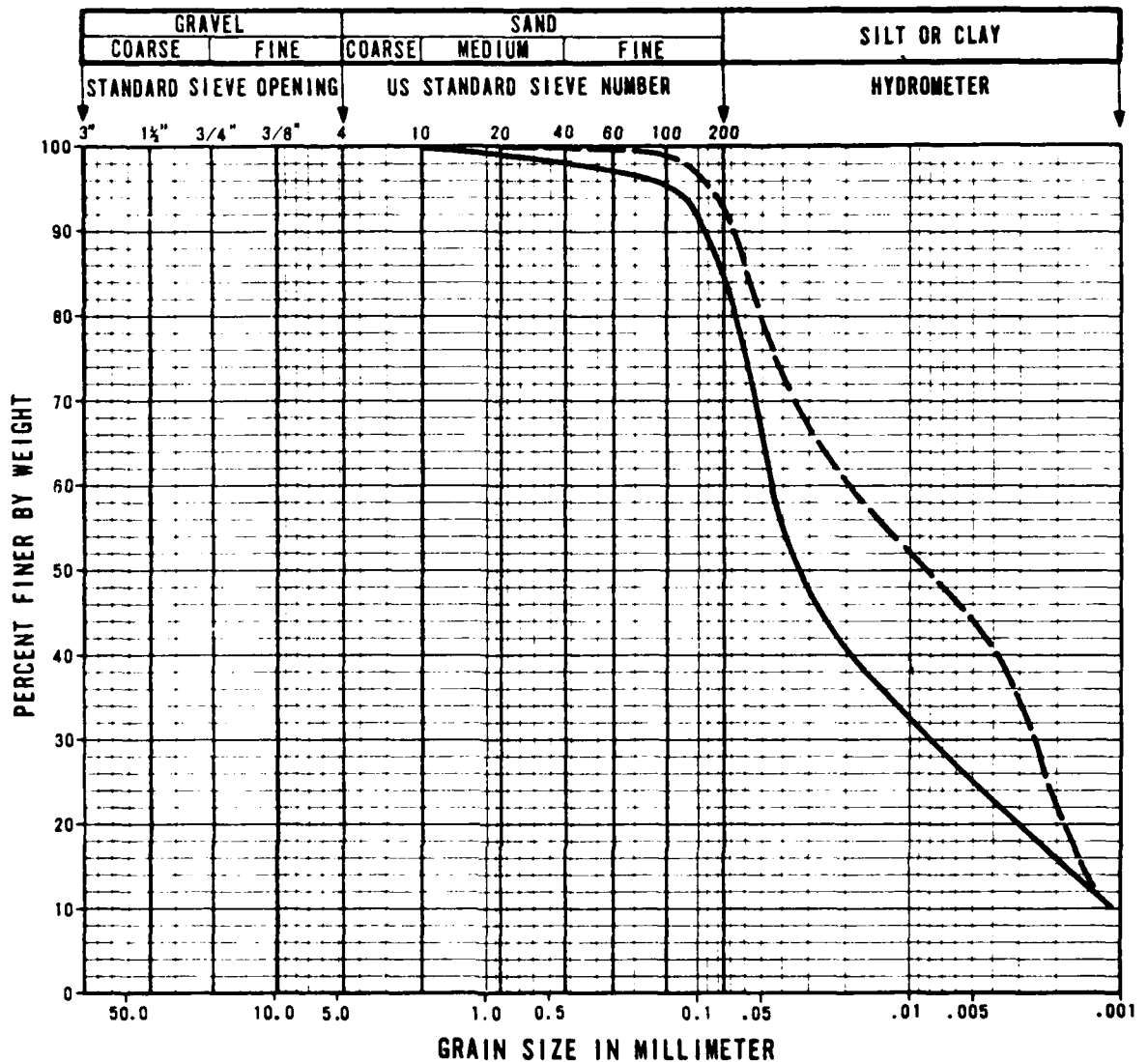
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-0-1	P-20	301.1-302.0	91.78-92.05				ML
- -	LD-0-1	P-21	350.0-351.5	106.68-107.14		NP		ML

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-221

FUGRO NATIONAL, INC.



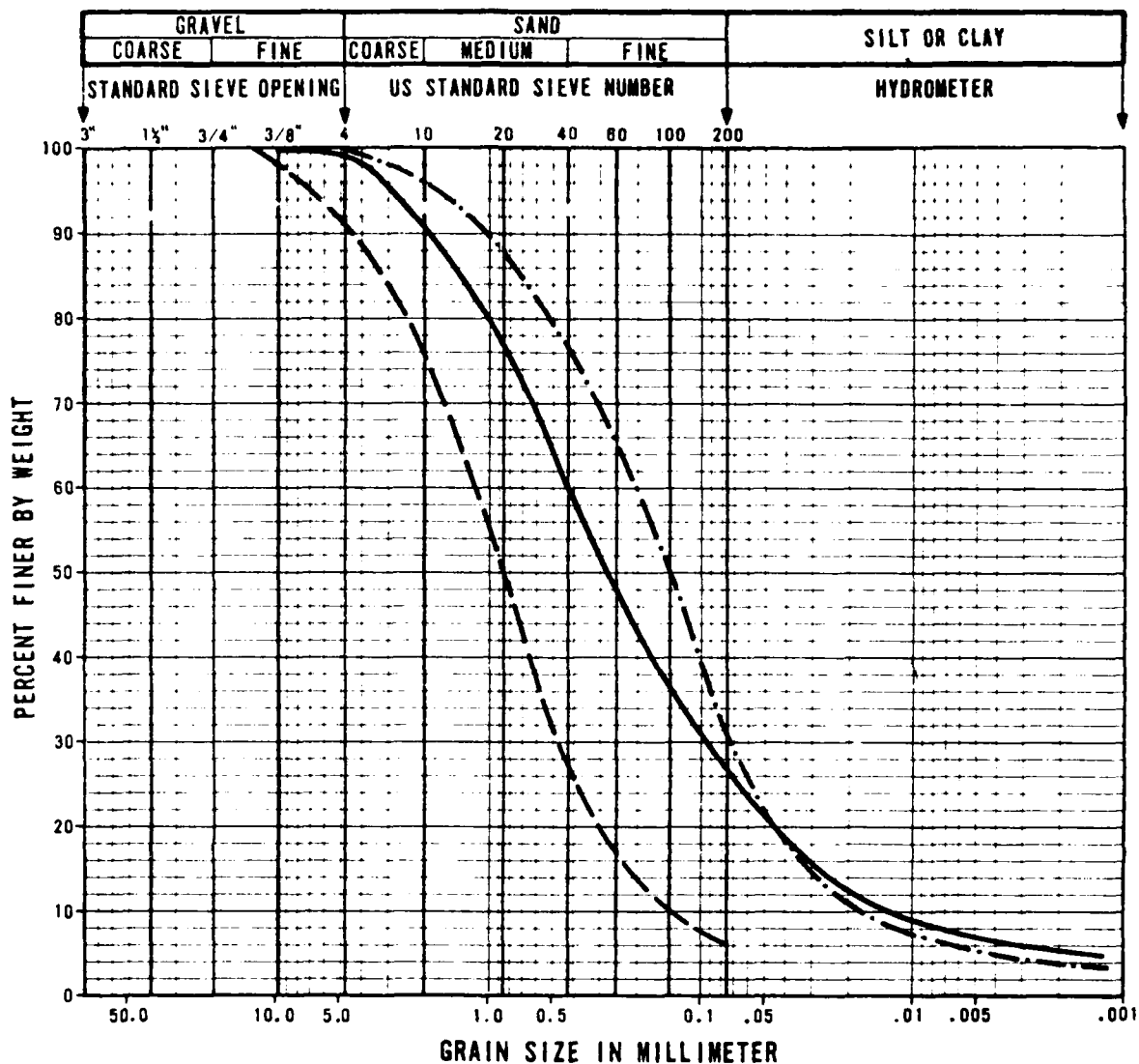
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-1	P-23	450.0-450.8	137.16-137.40	36	20	16	CL
- -	LD-D-1	P-25	600.0-600.8	182.88-183.12	52	22	30	CH

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-222

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-0-2	P-1	10.6-11.2	3.23-3.41		NP		SM
- - -	LD-0-2	P-3	20.0-20.6	6.10-6.28				SW SM
- · - · -	LD-0-2	P-5	40.0-40.6	12.19-12.37				SM

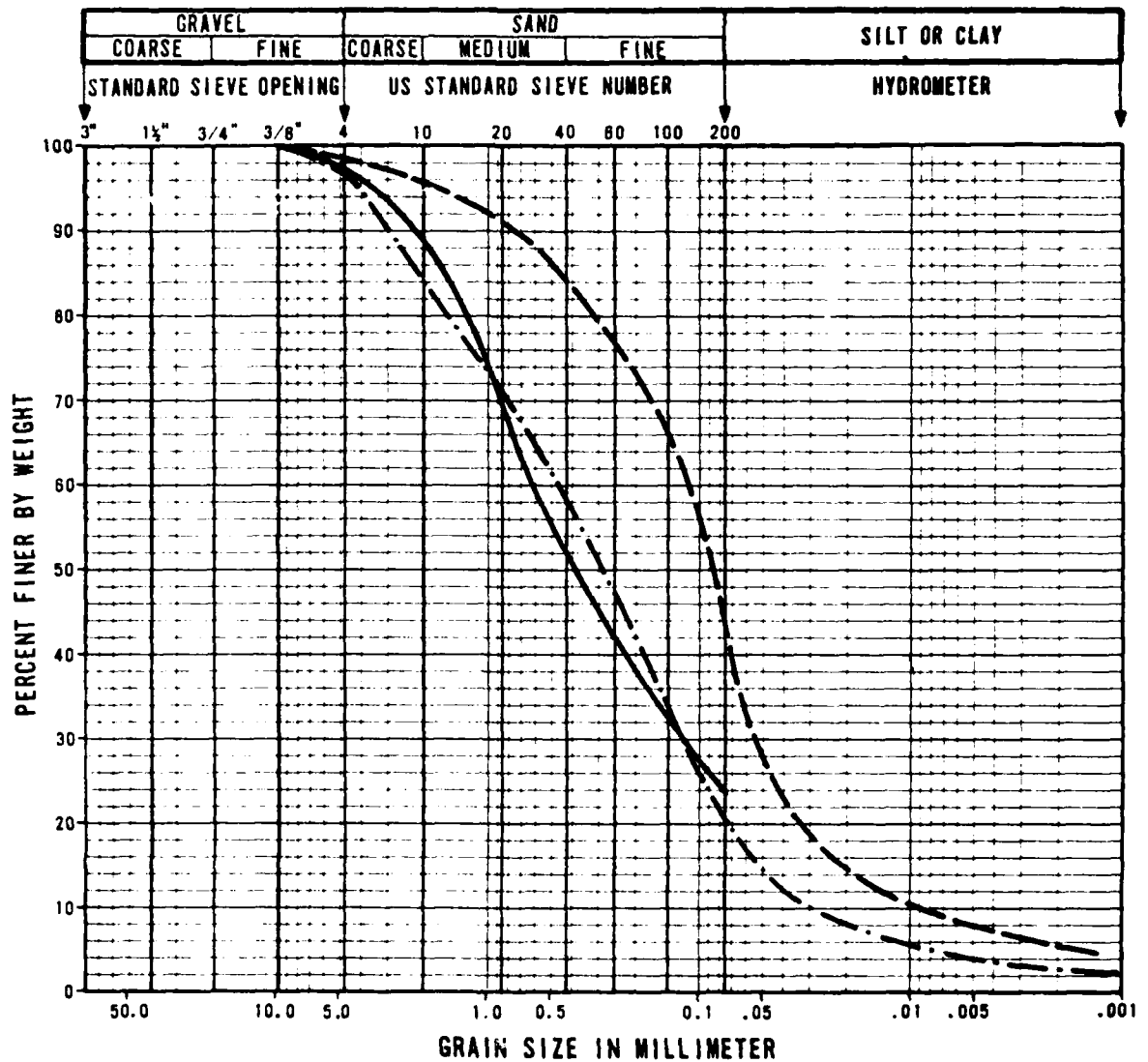
GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-223

FUGRO NATIONAL, INC.



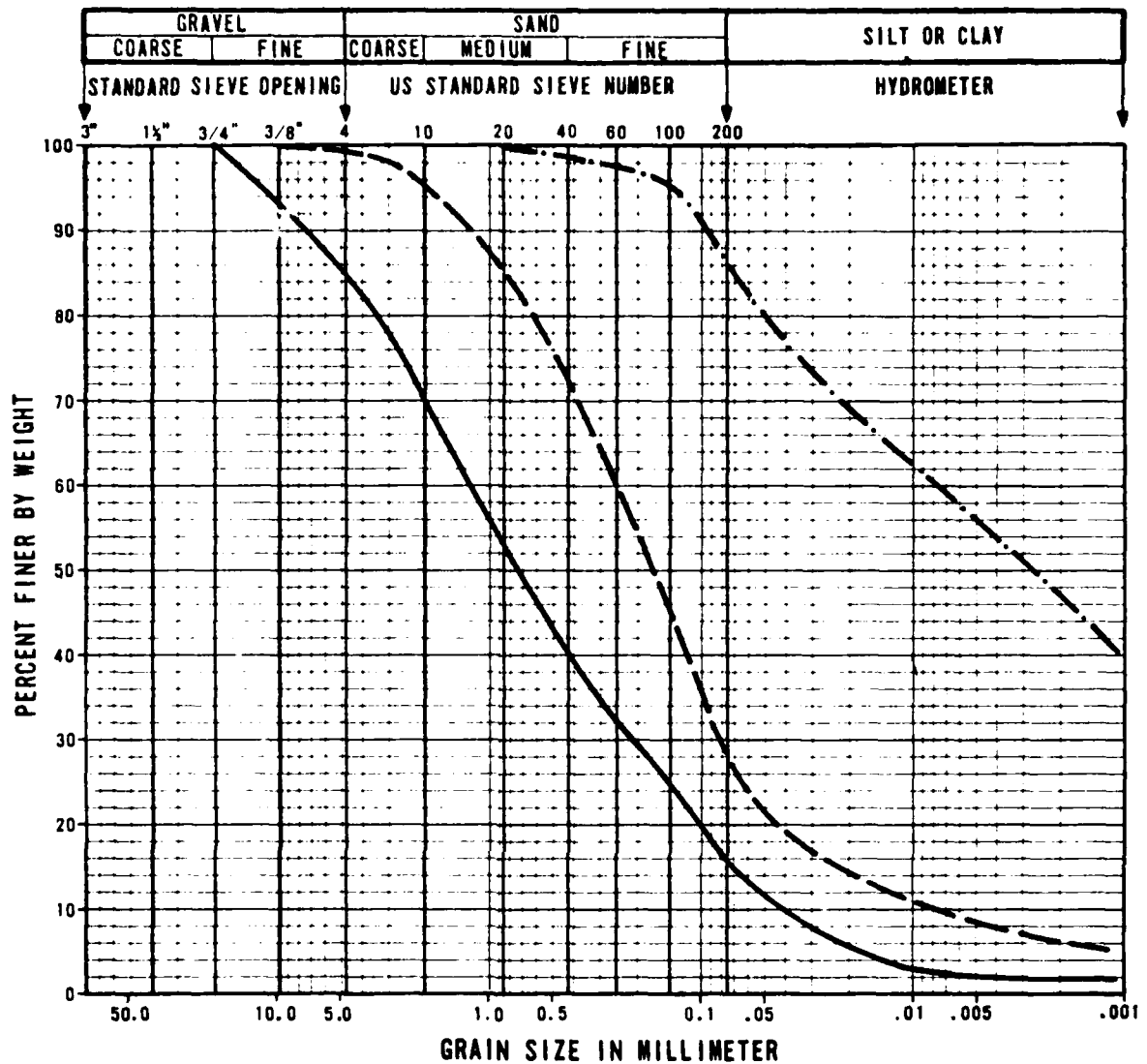
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-0-2	P-6	50.0-52.1	15.24-15.88		NP		SM
- - -	LD-0-2	P-7	60.0-60.6	18.29-18.47				SM
- · -	LD-0-2	P-9	80.0-82.1	24.38-25.02				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-224

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-2	P-11	100.0-101.4	30.48-30.91		NP		SM
- - -	LD-D-2	P-12	125.6-126.2	38.28-38.47				SM
- · -	LD-D-2	P-14	175.6-176.7	53.52-53.86	50	20	30	CL CH

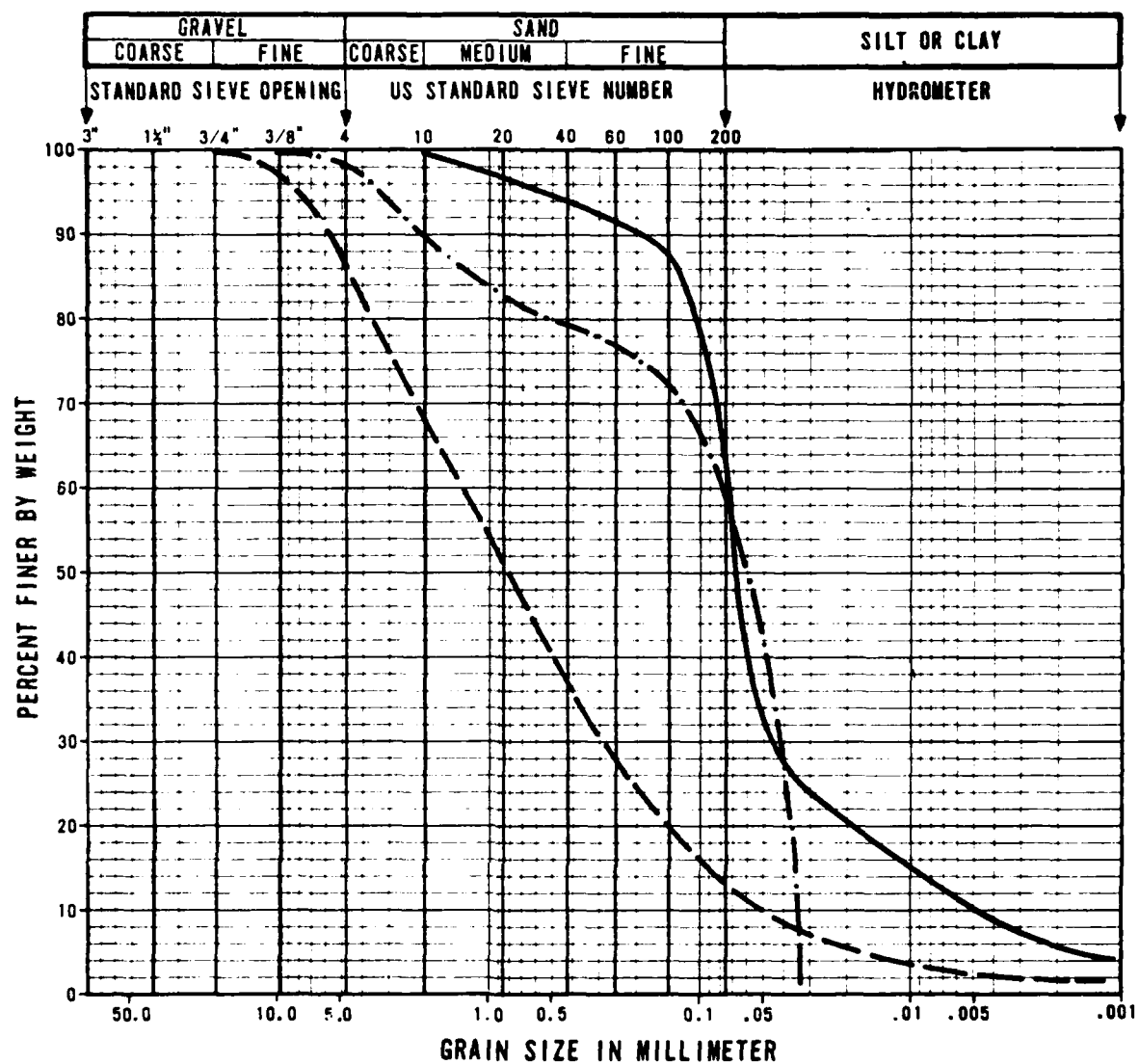
GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-225

FUGRO NATIONAL, INC.



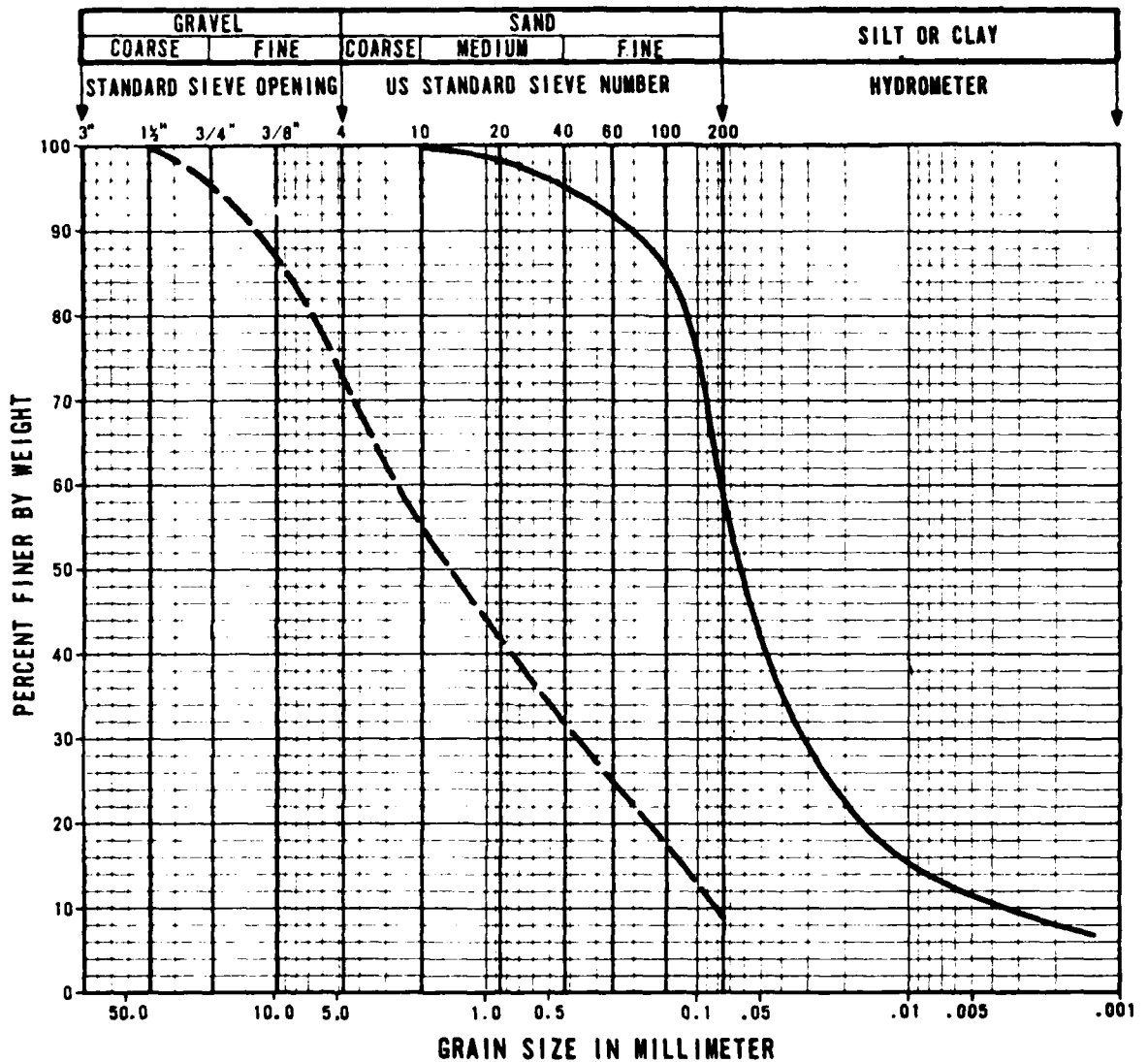
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-2	P-15	200.0-200.6	60.98-61.14				ML
- - -	LD-D-2	P-16	225.0-227.2	68.58-69.25		NP		SM
- · -	LD-D-2	P-17	249.0-250.3	75.90-76.29				ML

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-226

FUGRO NATIONAL, INC.



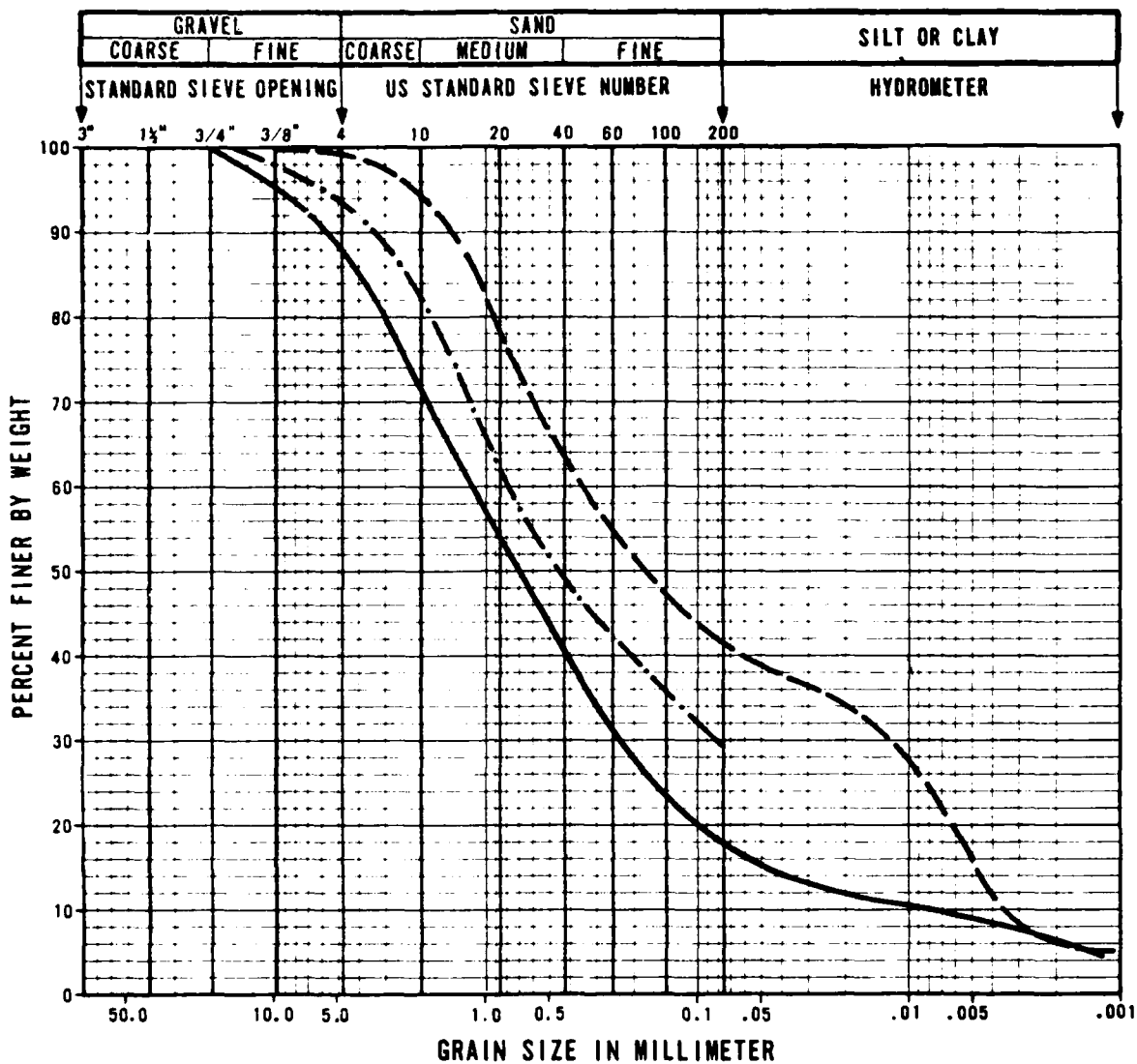
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-2	P-18	275.0-275.6	83.82-84.00				ML
- - -	LD-D-2	P-19	300.6-301.5	91.62-91.90				SP/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-227

FUGRO NATIONAL, INC.



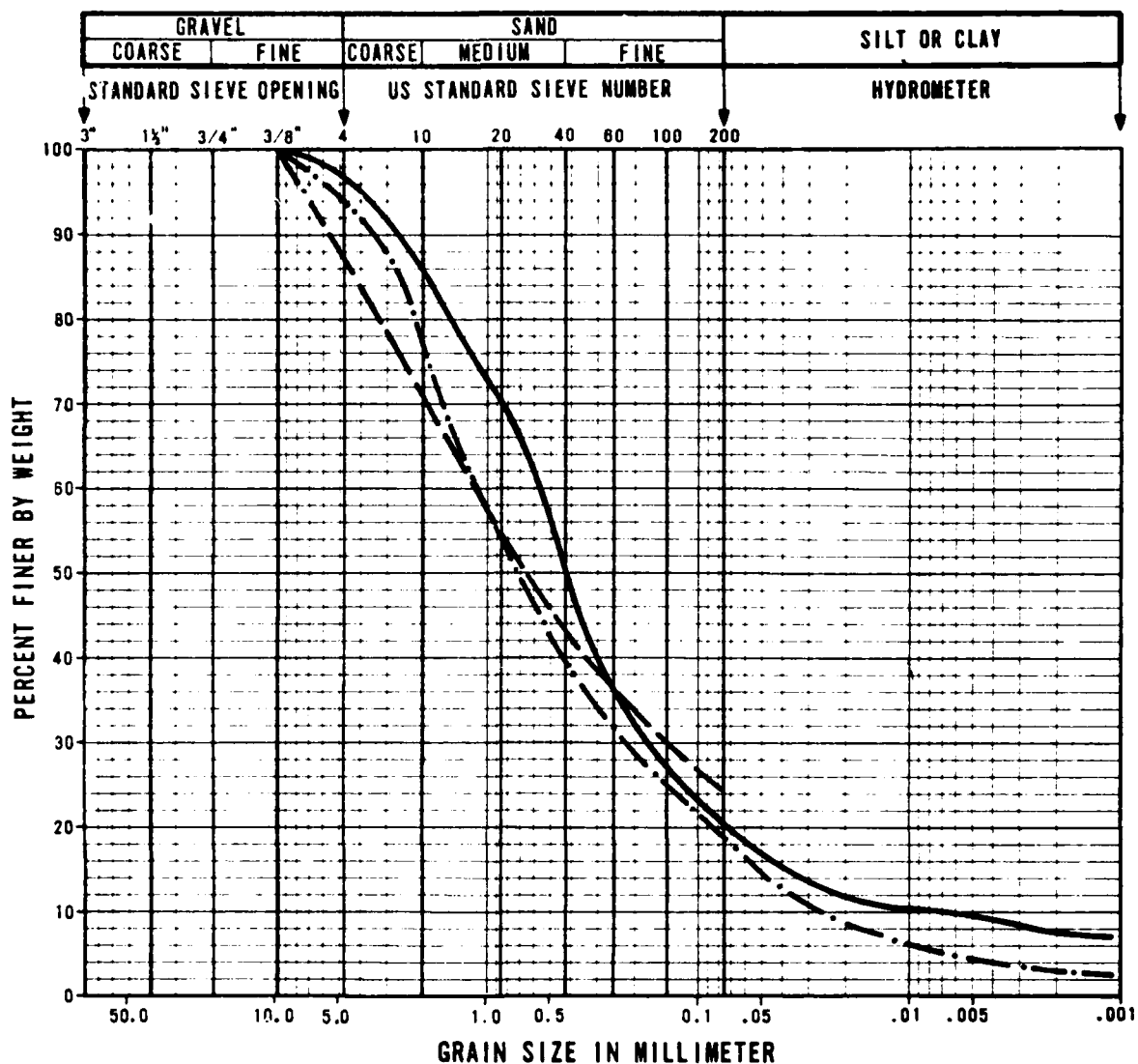
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-3	P-1	5.9-6.5	1.80-1.98	50	24	26	SC
- - -	LD-D-3	P-2	10.0-10.6	3.05-3.23	35	18	17	SC
- · -	LD-D-3	P-4	21.5-22.1	6.55-6.74	37	21	16	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-228

FUGRO NATIONAL, INC.



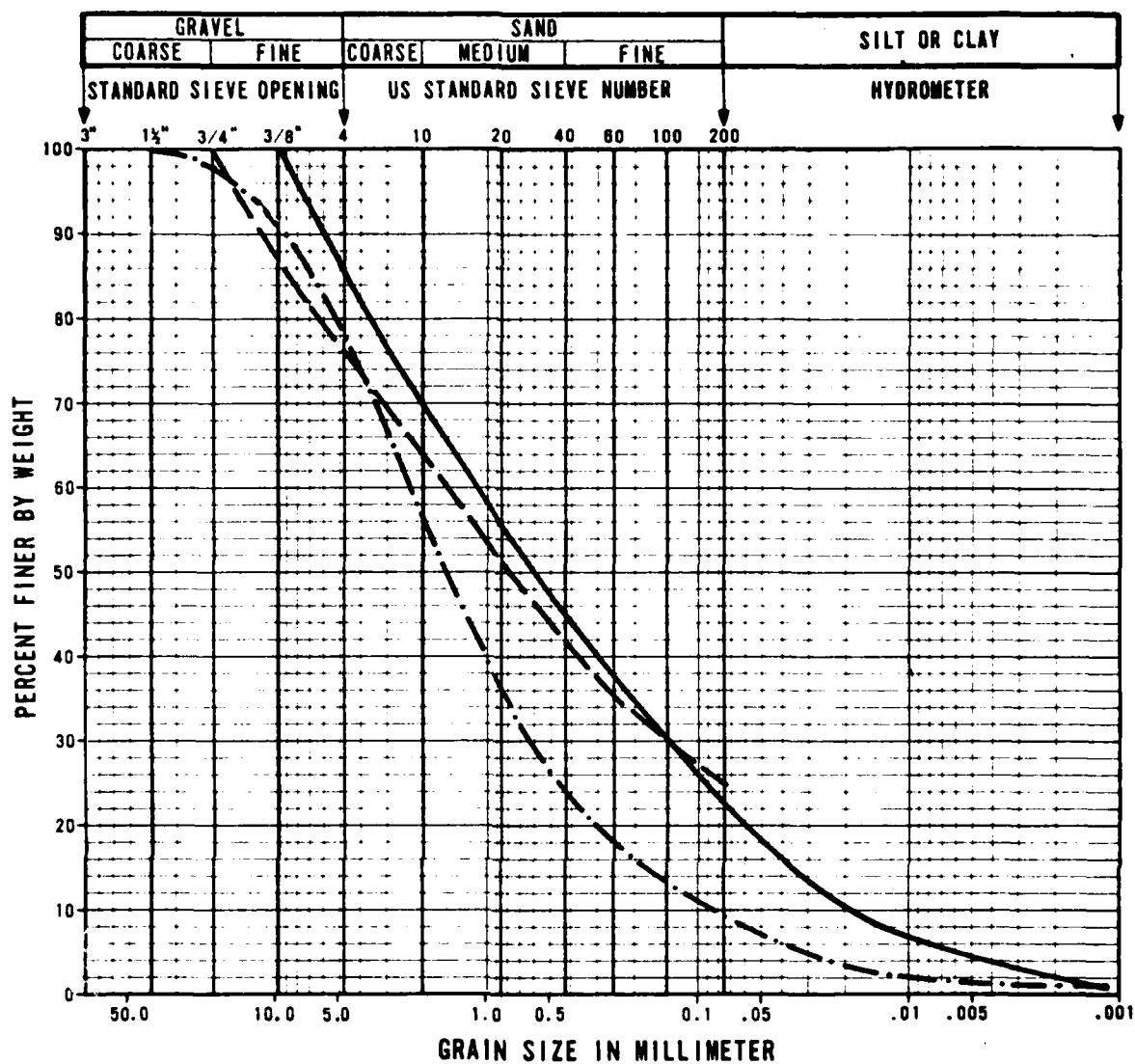
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-3	P-5	30.0-30.6	9.14-9.33	✓			SC
- - -	LD-D-3	P-5	30.6-31.5	9.33-9.60	42	20	22	SC
- · - · -	LD-D-3	P-7	50.0-50.6	15.24-15.42				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-229

FUGRO NATIONAL, INC.

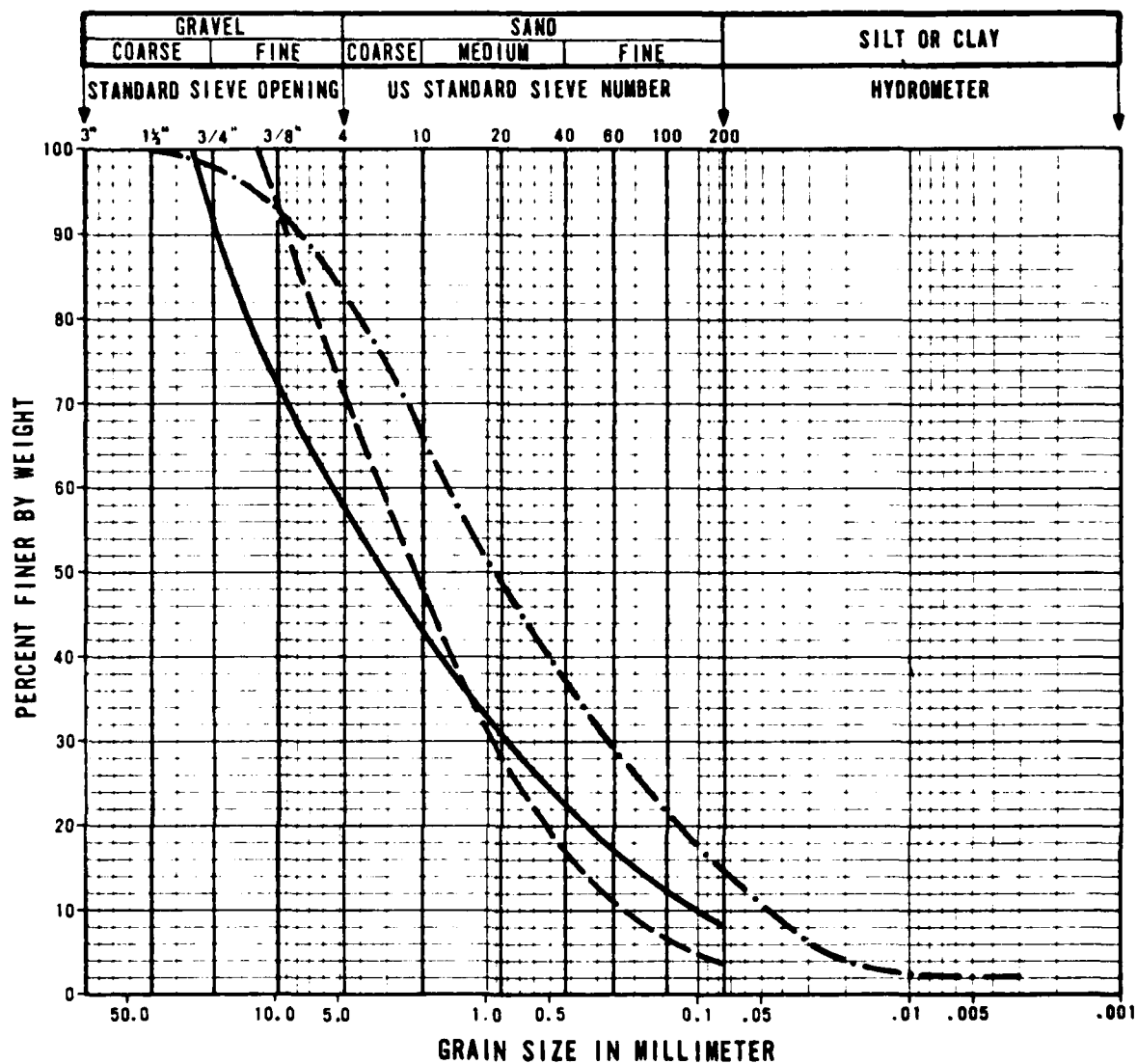


GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS

FIGURE
C-230

FUGRO NATIONAL, INC.



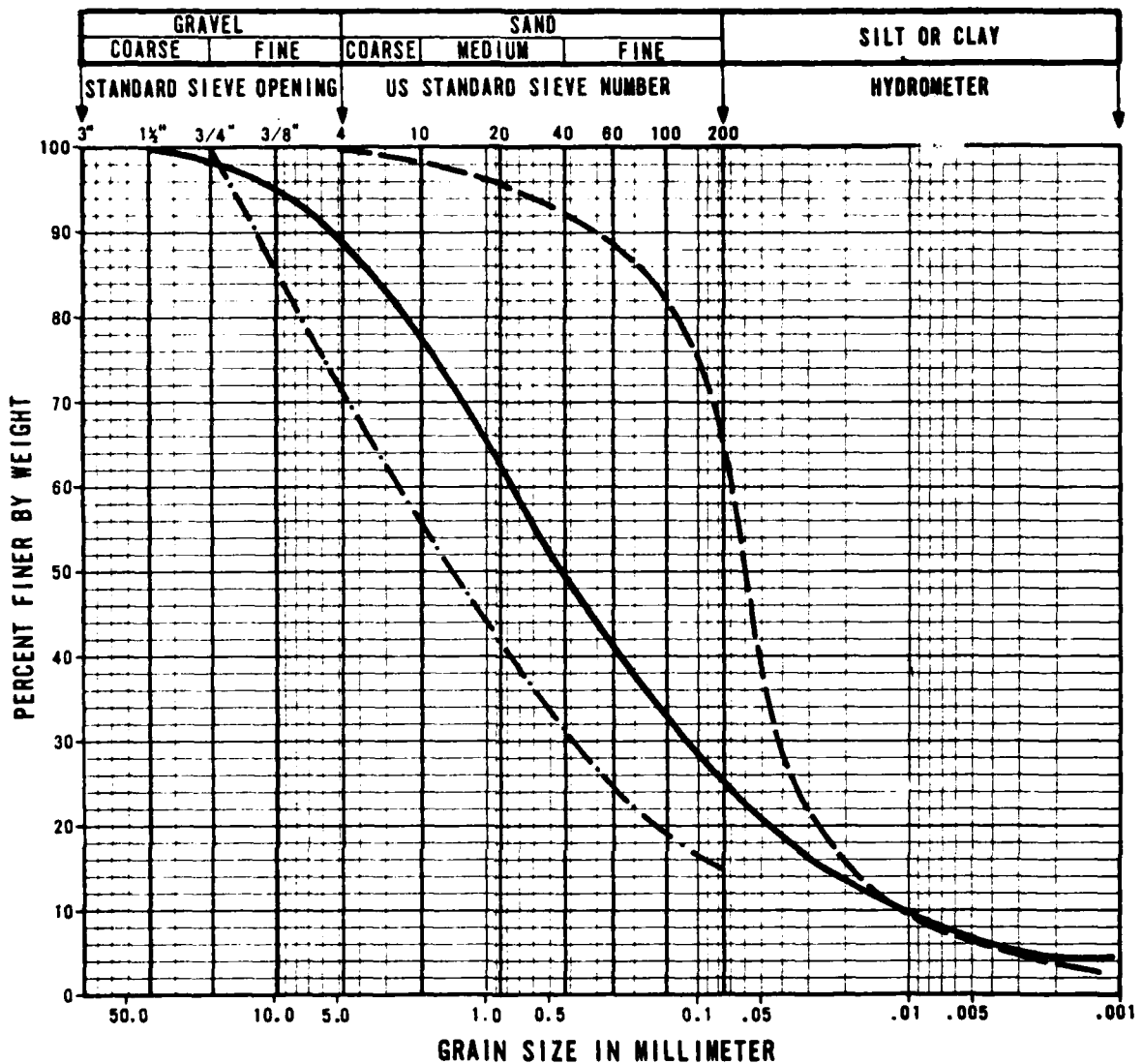
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-D-3	P-15	175.6-176.5	53.52-53.80				SW SM
- - -	LD-D-3	P-17	225.0-228.3	68.58-68.98				SW
- · - · -	LD-D-3	P-19	275.0-276.3	83.82-84.22				SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-231

FUGRO NATIONAL, INC.



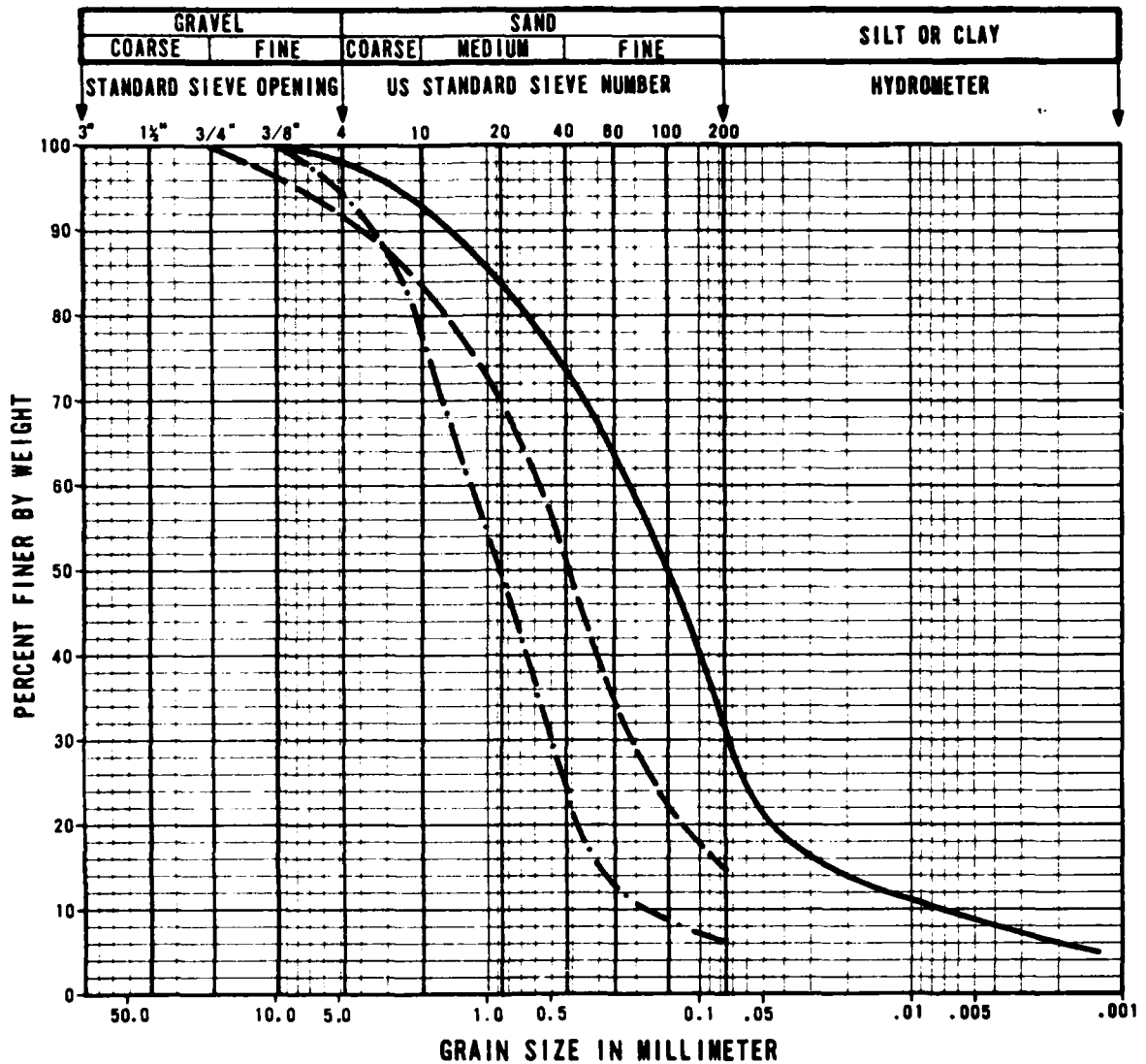
SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-0-3	P-20	300.0-300.6	91.44-91.62				SM
- - -	LD-0-3	P-22	400.0-400.6	121.92-122.10		NP		ML
- · -	LD-0-3	P-23	450.0-450.6	137.16-137.34				SM

GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-232

FUGRO NATIONAL, INC.



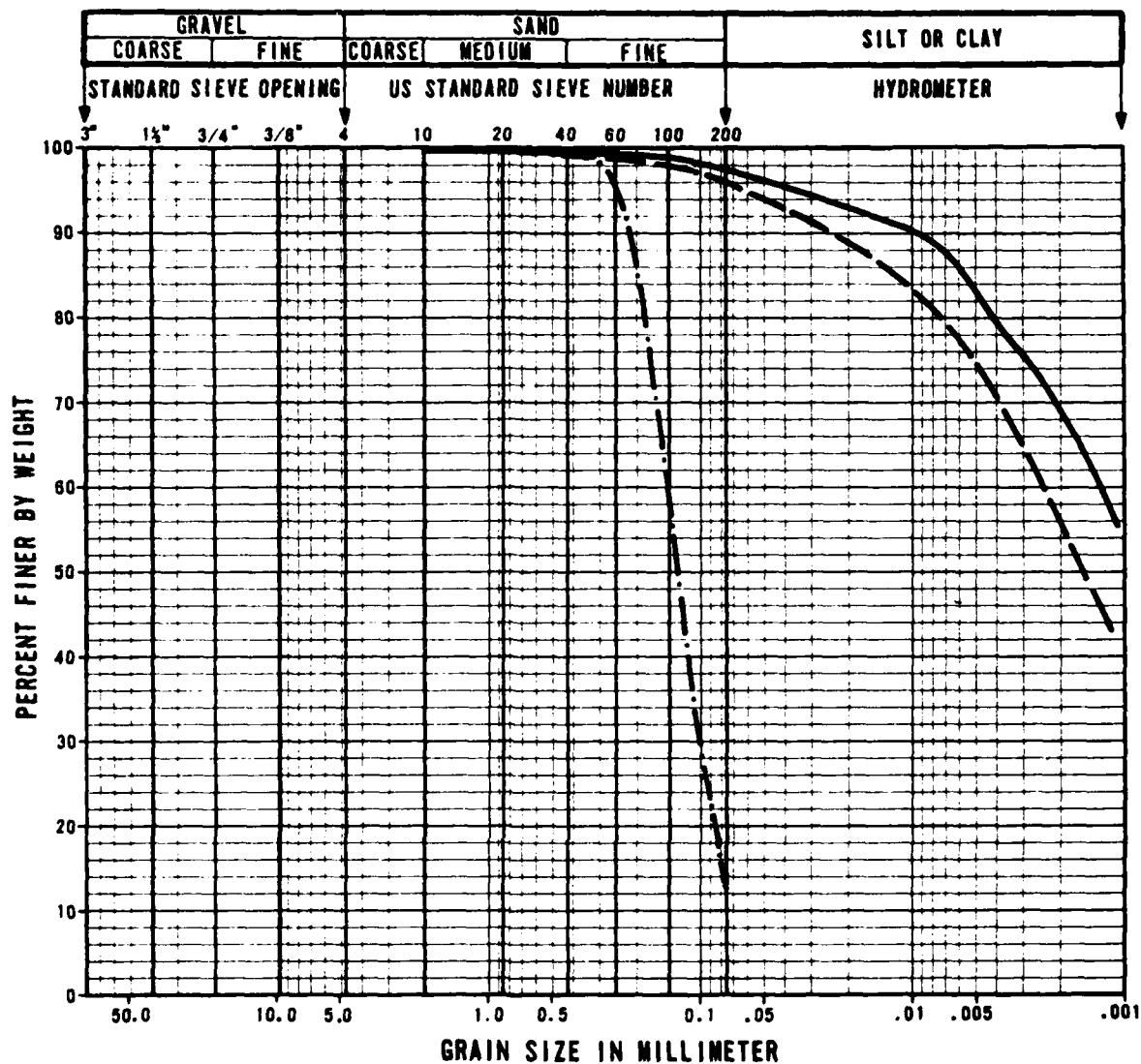
GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE

C-233

FUGRO NATIONAL, INC.



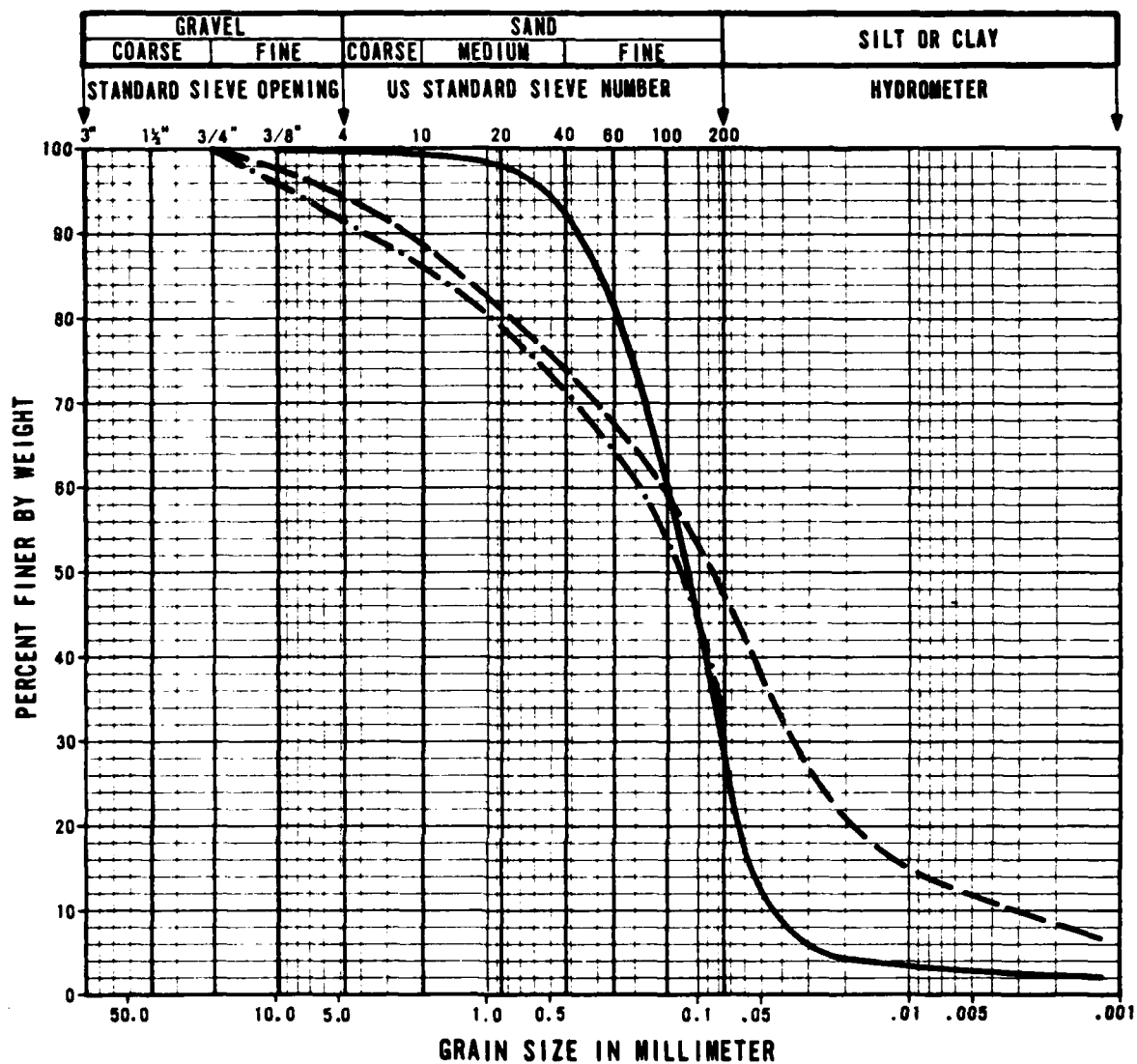
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-1	B-4	12.0-13.0	3.66-3.96	73	36	37	MH
- - -	LD-T-1	B-5	15.0-16.0	4.57-4.88	61	27	34	CH
- · -	LD-T-1	B-6	18.0-19.5	5.49-5.94		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-234

FUGRO NATIONAL, INC.



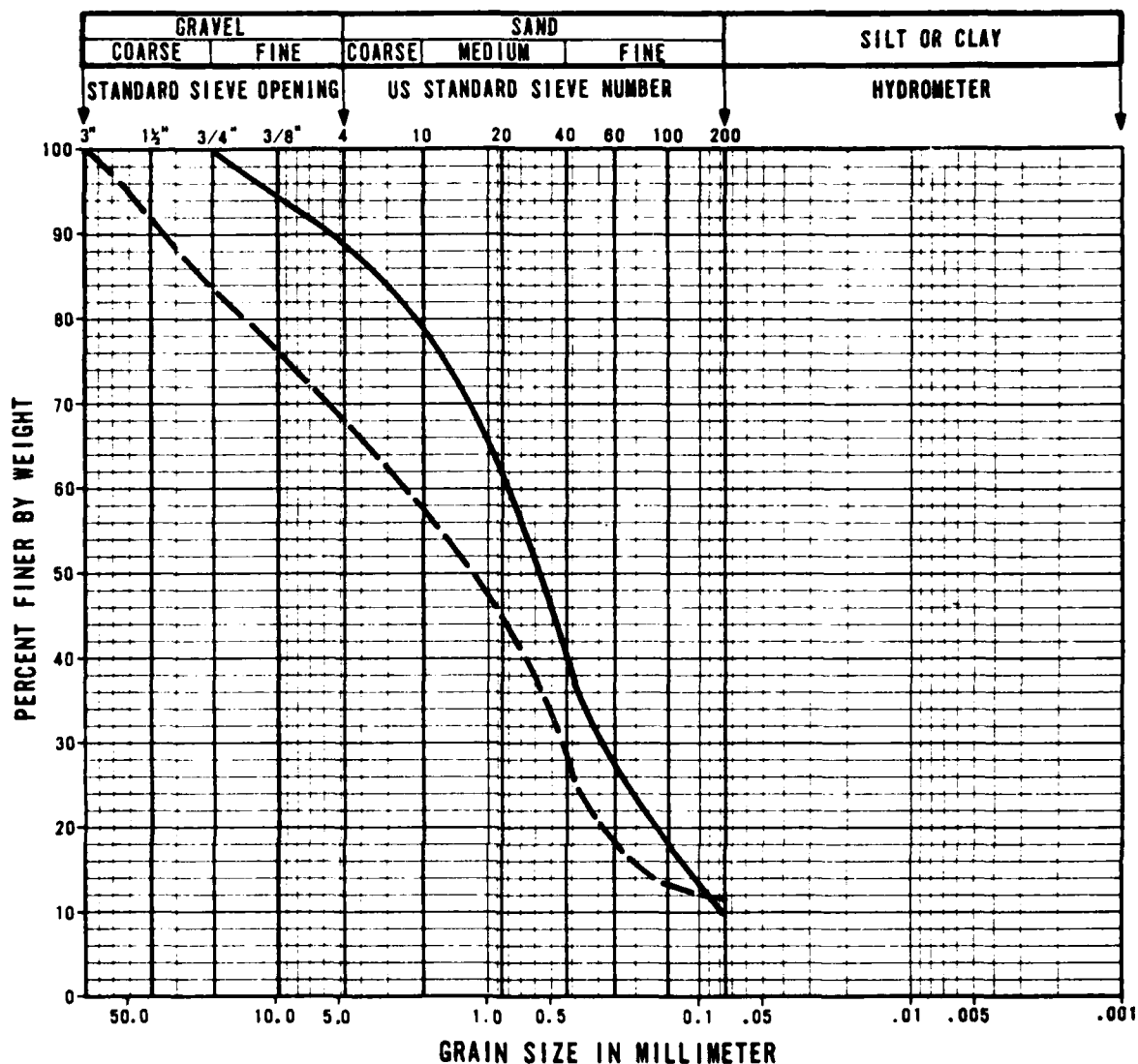
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-2	B-1	0.0-1.0	0.00-0.30		NP		SM
- - -	LD-T-2	B-2	6.0-8.0	1.83-2.44	33	25	8	SM
- · -	LD-T-2	B-3	18.0-20.0	5.49-6.10		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-235

FUGRO NATIONAL, INC.



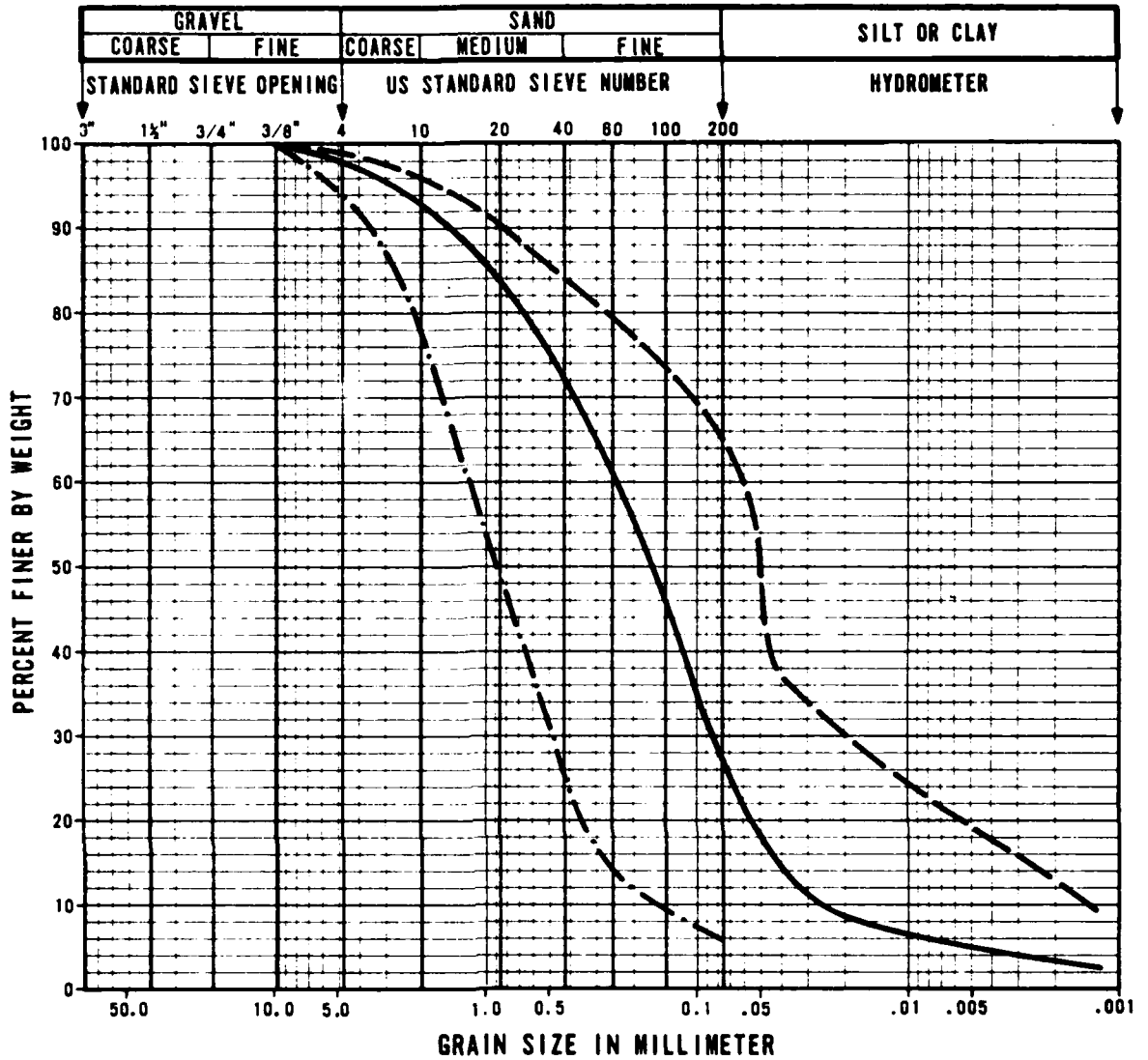
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-3	B-2	5.0-6.5	1.52-1.98		NP		SW/SM
- - -	LD-T-3	B-3	18.0-20.0	5.49-6.10				SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-236

FUGRO NATIONAL, INC.



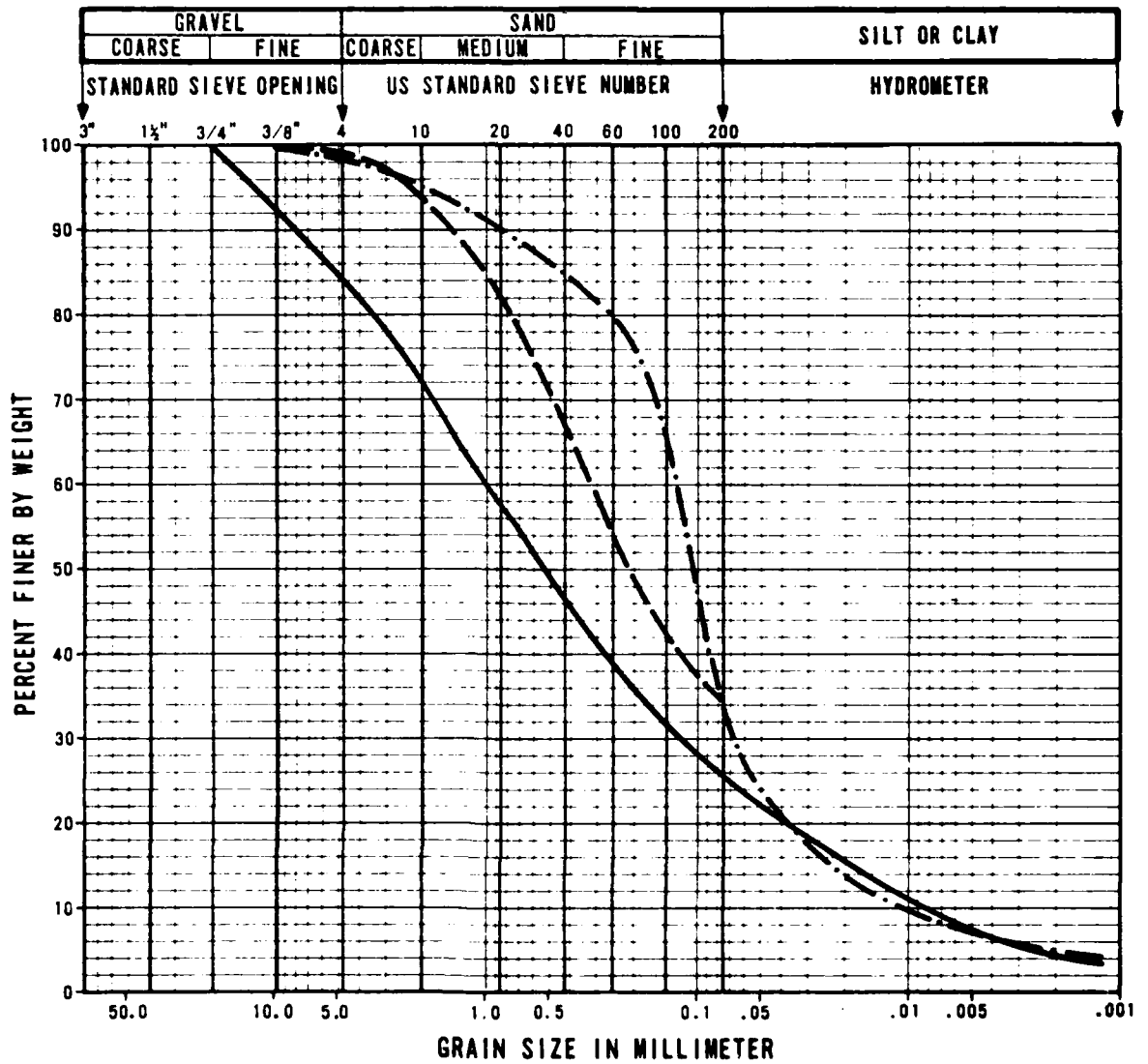
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-4	B-1	0.0-1.0	0.00-0.30		NP		SM
- - -	LD-T-4	B-2	3.0-5.0	0.91-1.52	35	21	14	CL
- · -	LD-T-4	B-3	18.0-20.0	5.49-6.10				SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-237

FUGRO NATIONAL, INC.



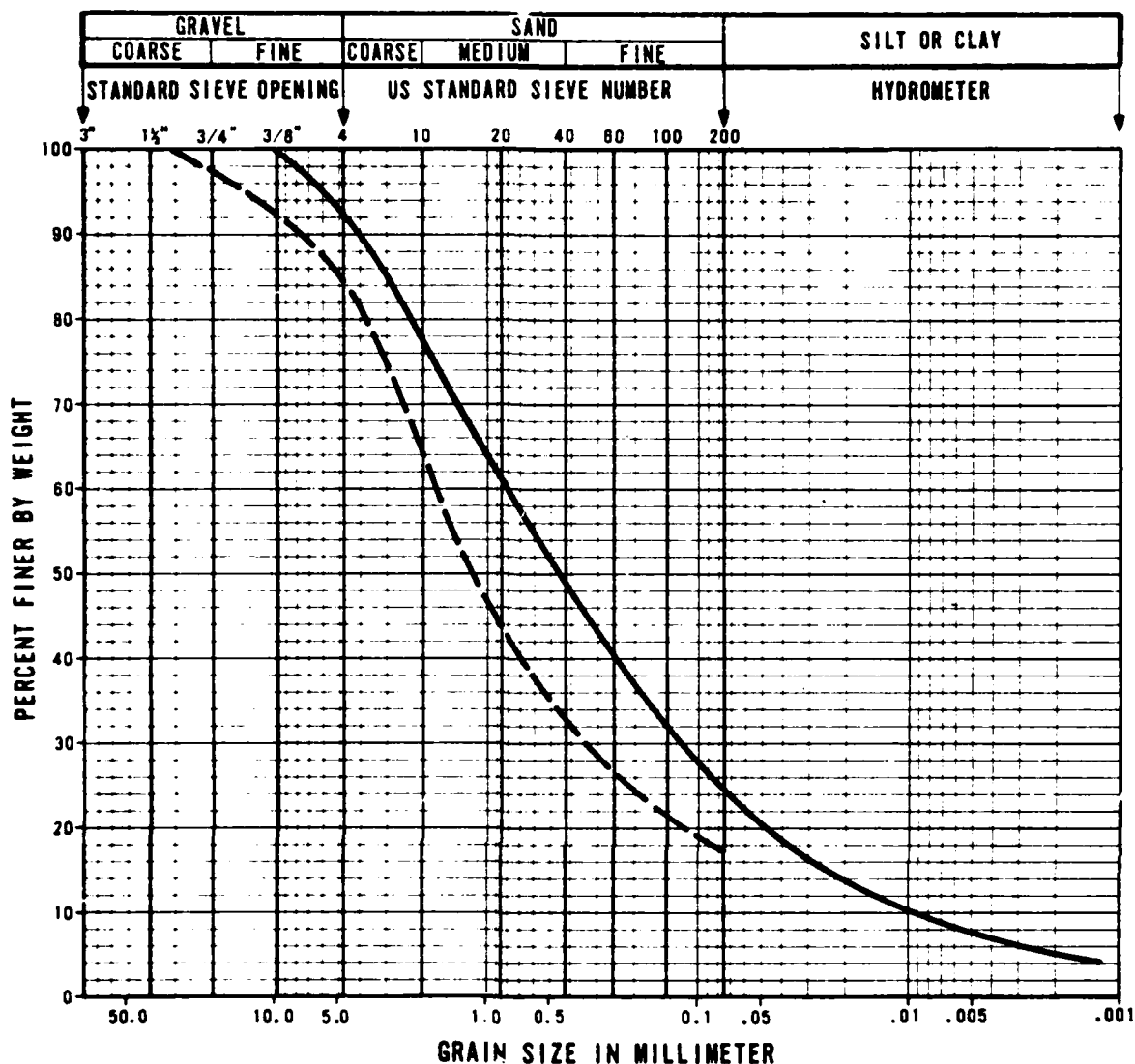
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-5	B-1	0.0-0.5	0.00-0.15				SM
- - -	LD-T-5	B-2	0.5-1.5	0.15-0.46	24	16	8	SC
- · -	LD-T-5	B-3	10.0-12.0	3.05-3.66		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-238

FUGRO NATIONAL, INC.



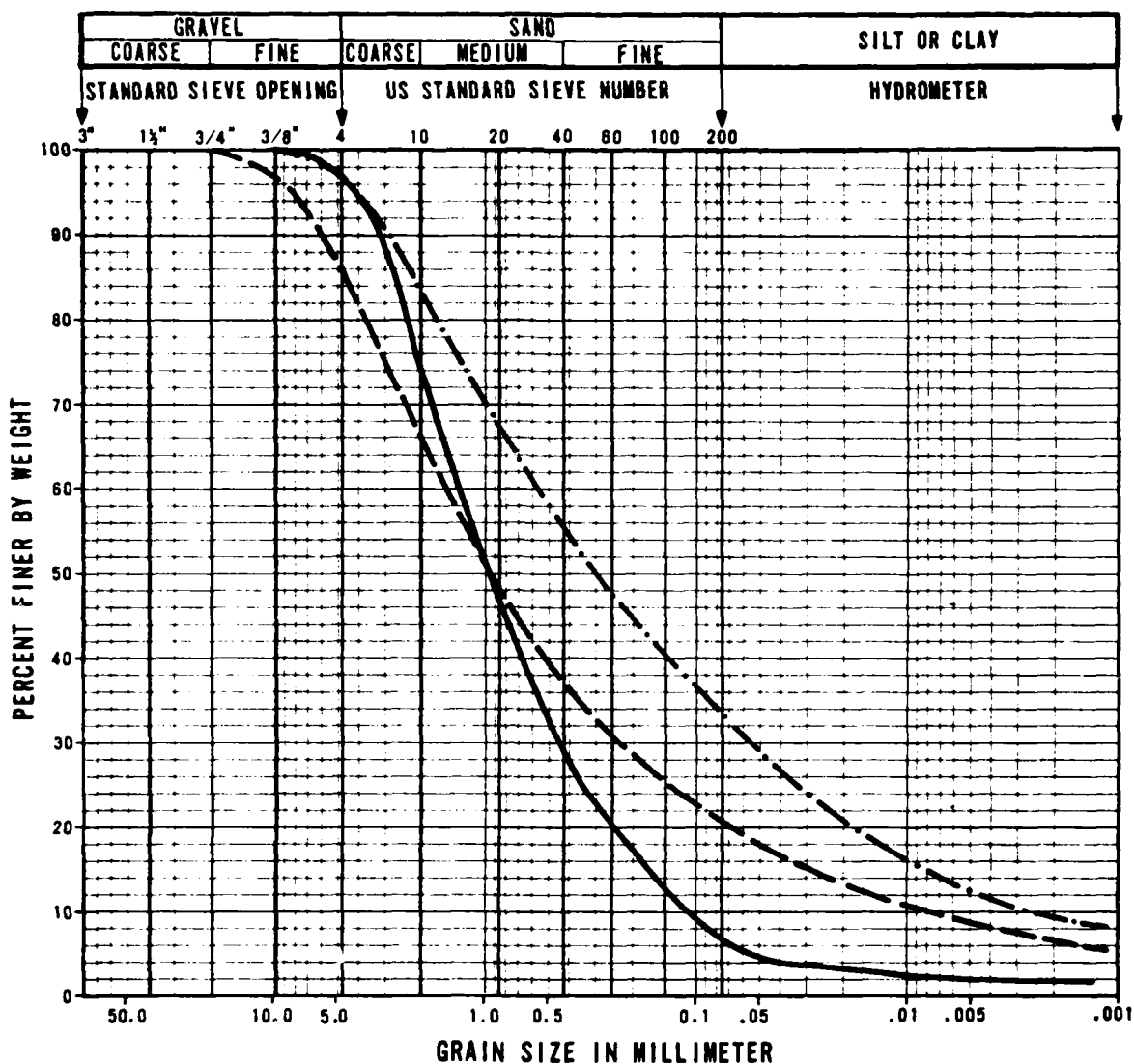
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-6	B-1	0.0-0.5	0.00-0.15	27	19	8	SC
- - -	LD-T-6	B-2	3.0-4.0	0.91-1.22		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MY SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-239

FUGRO NATIONAL, INC.



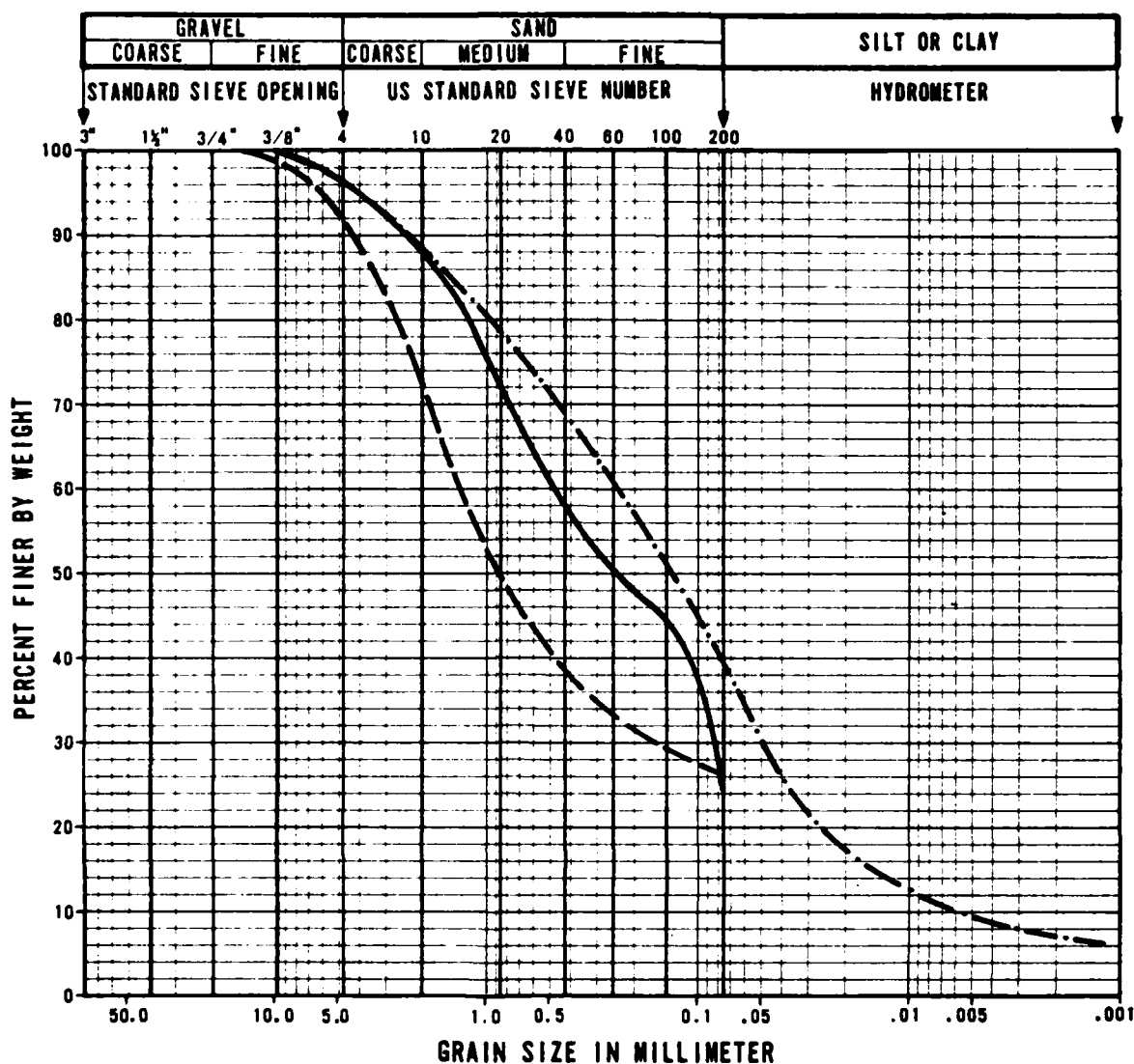
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-7	B-1	0.0-1.0	0.00-0.30		NP		SW/SM
- - -	LD-T-7	B-2	6.0-8.0	1.83-2.44	43	22	21	SC
- · -	LD-T-7	B-3	19.0-21.0	5.79-6.40	29	17	12	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-240

UGRO NATIONAL, INC.



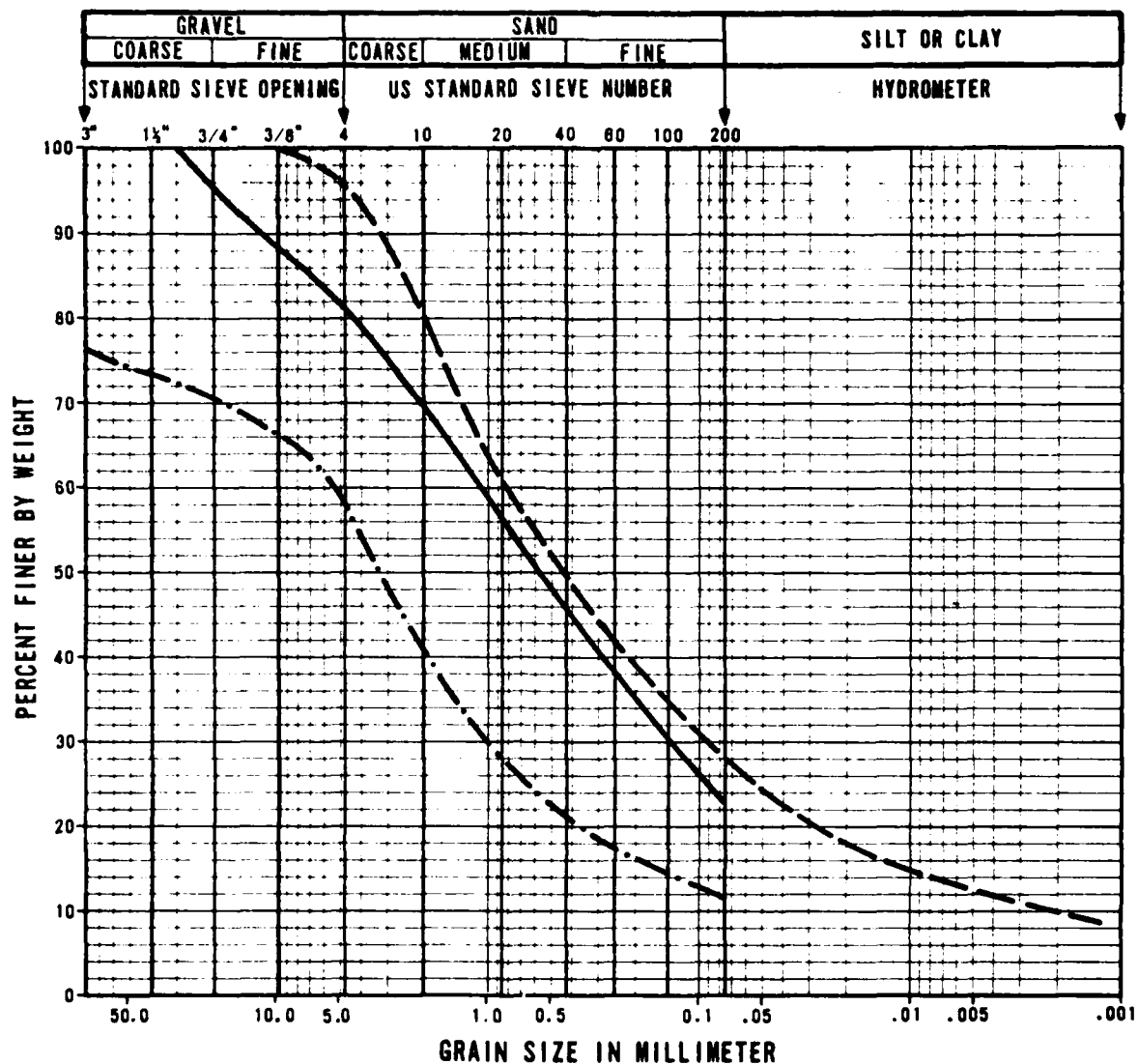
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-8	B-1	0.0-1.0	0.00-0.30				SM
- - -	LD-T-8	B-2	3.0-5.0	0.91-1.52	54	22	32	SC
- · - · -	LD-T-8	B-3	17.0-19.0	5.18-5.79	32	20	12	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-241

FUGRO NATIONAL, INC.



SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-9	B-1	0.0-1.0	0.00-0.30		NP		SM
- -	LD-T-9	B-2	8.0-10.0	2.44-3.05	42	22	20	SC
- · -	LD-T-9	B-3*	19.0-21.0	5.79-6.40	37	20	17	SP/SC

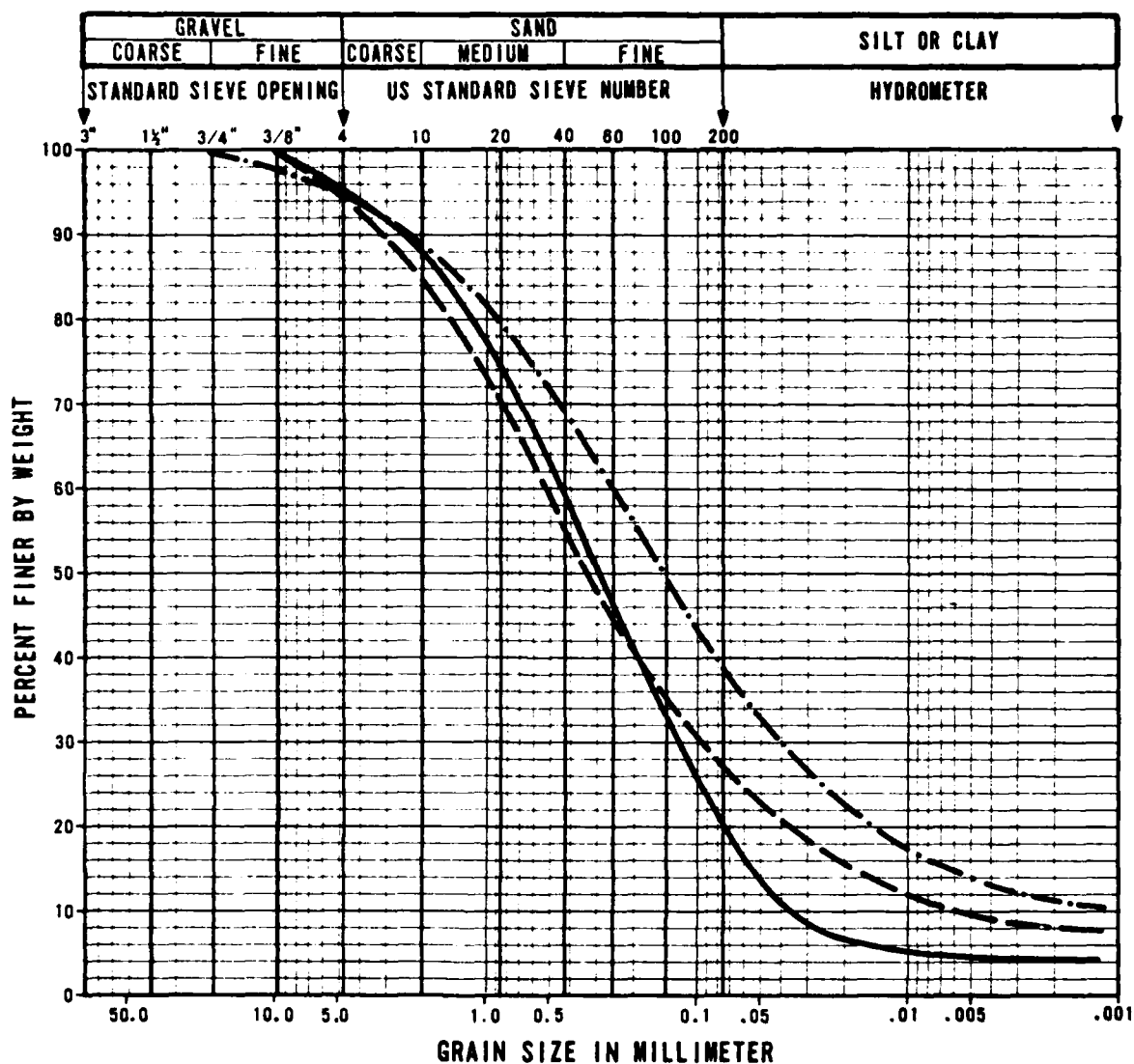
*All material passed a 6" sieve

GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-242

FUGRO NATIONAL, INC.



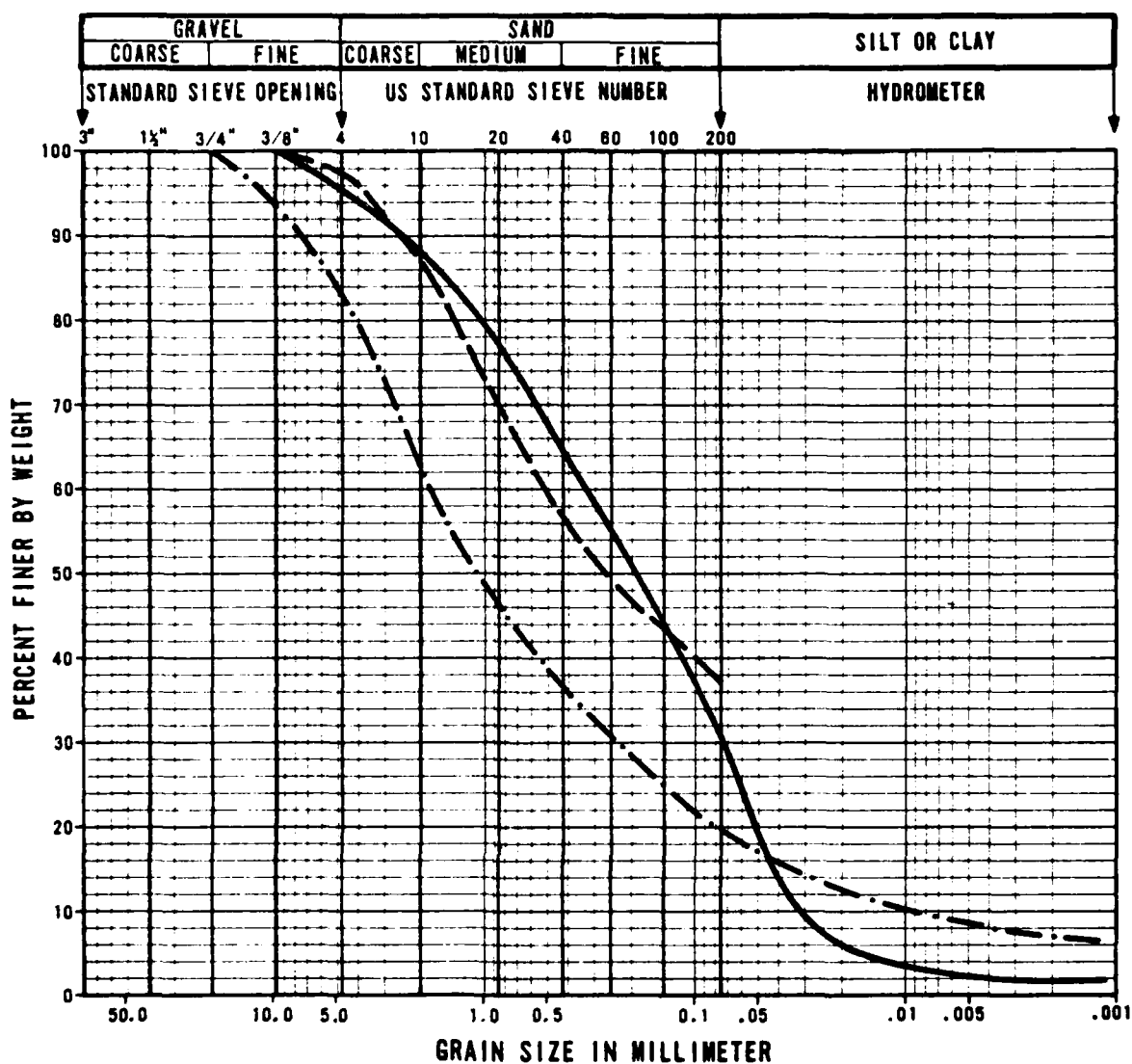
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
————	LD-T-10	B-1	0.0-1.0	0.00-0.30		NP		SM
-----	LD-T-10	B-2	7.0-9.0	2.13-2.74		NP		SM
- · - · -	LD-T-10	B-3	19.0-21.0	5.79-6.40	34	20	14	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-243

FUGRO NATIONAL, INC.



SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-11	B-1	0.0-1.0	0.00-0.30		NP		SM
- - -	LD-T-11	B-2	7.0-9.0	2.13-2.74	46	20	26	SC
- · -	LD-T-11	B-3	19.0-21.0	5.79-6.40	38	19	19	SC

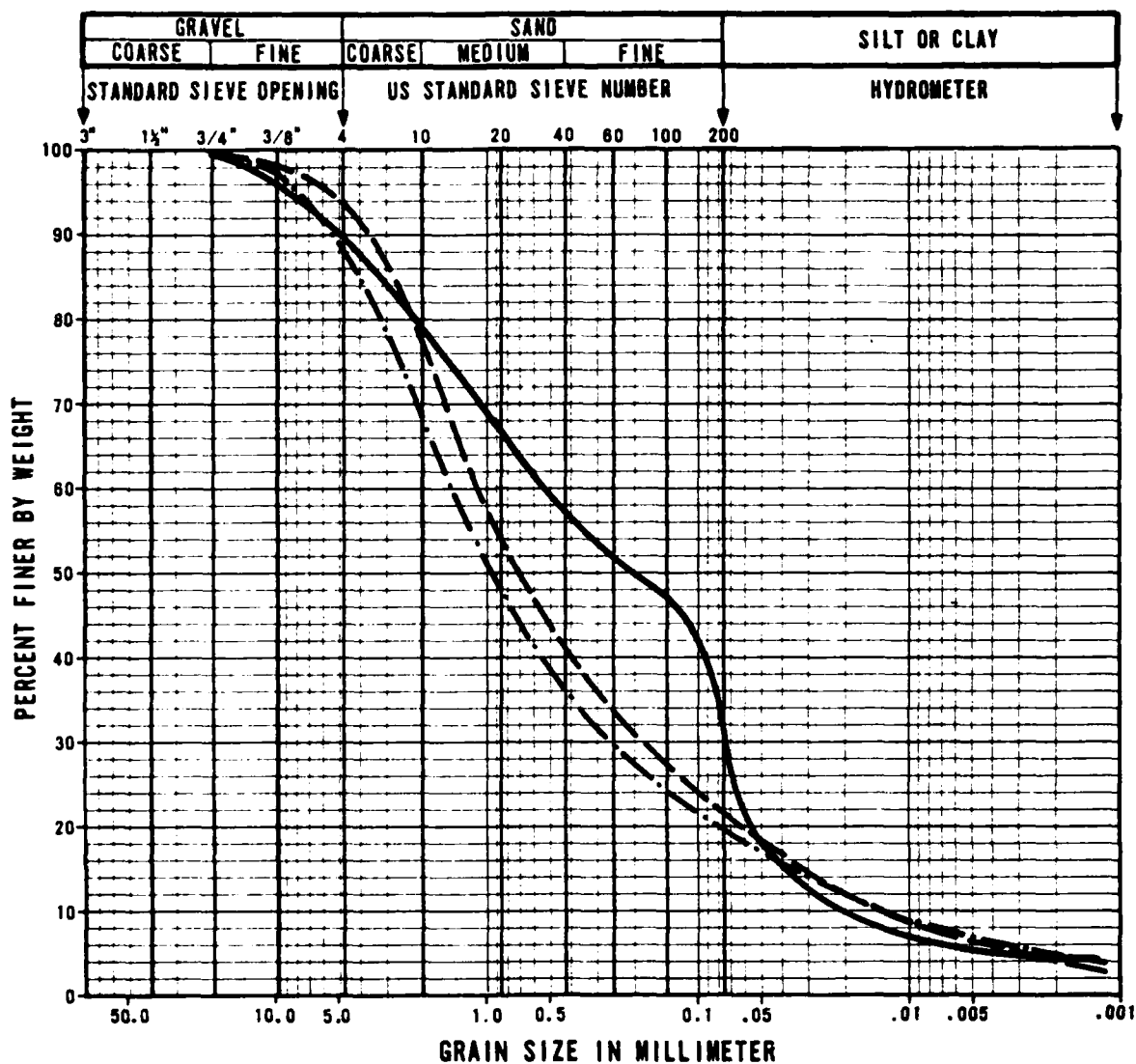
GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-244

FUGRO NATIONAL, INC.



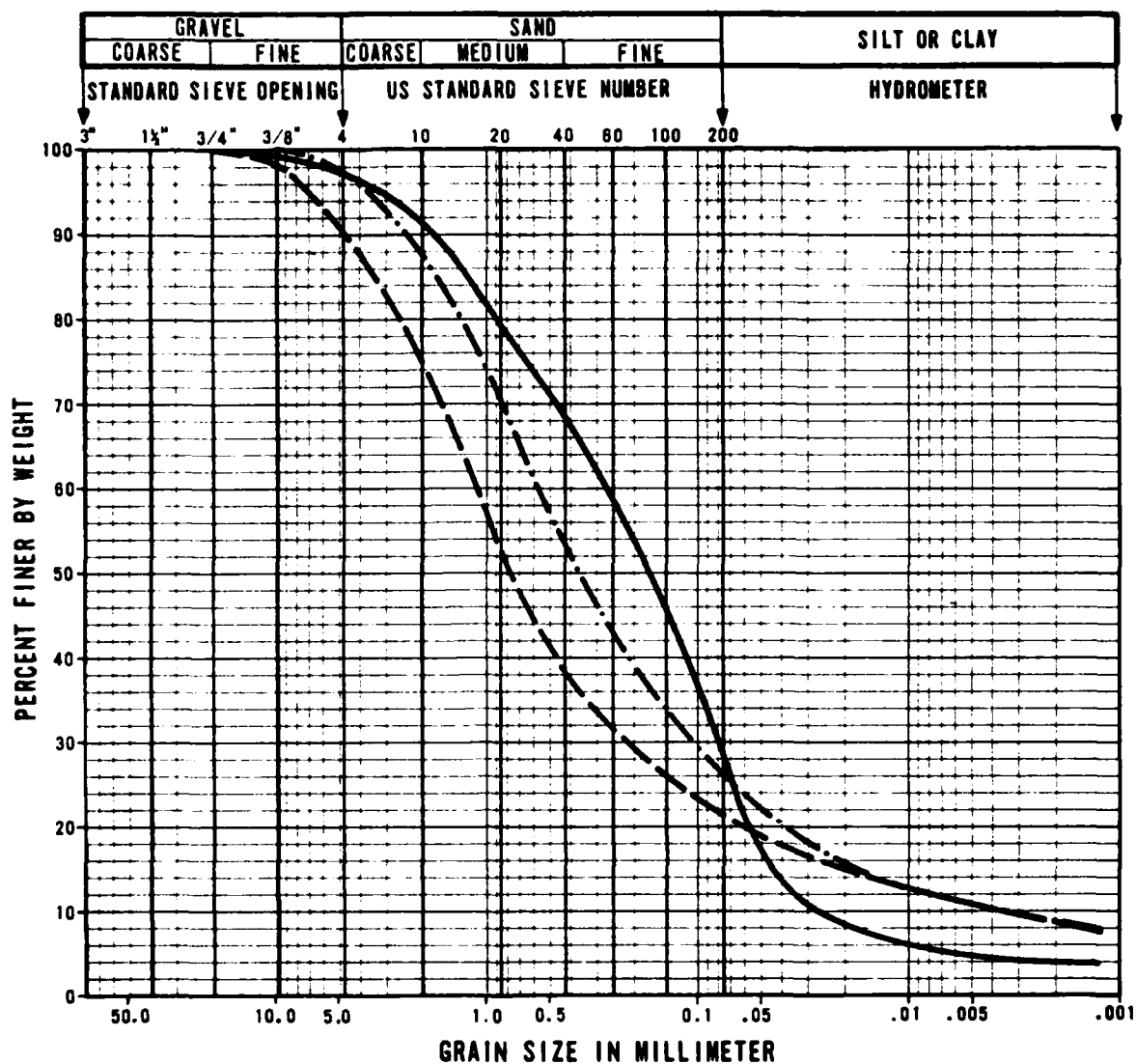
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-12	8-1	0.0-1.0	0.00-0.30		NP		SM
- - -	LD-T-12	8-2	6.0-8.0	1.83-2.44	46	22	24	SC
- · -	LD-T-12	8-3	19.0-21.0	5.79-6.40	67	27	40	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-245

FUGRO NATIONAL, INC.

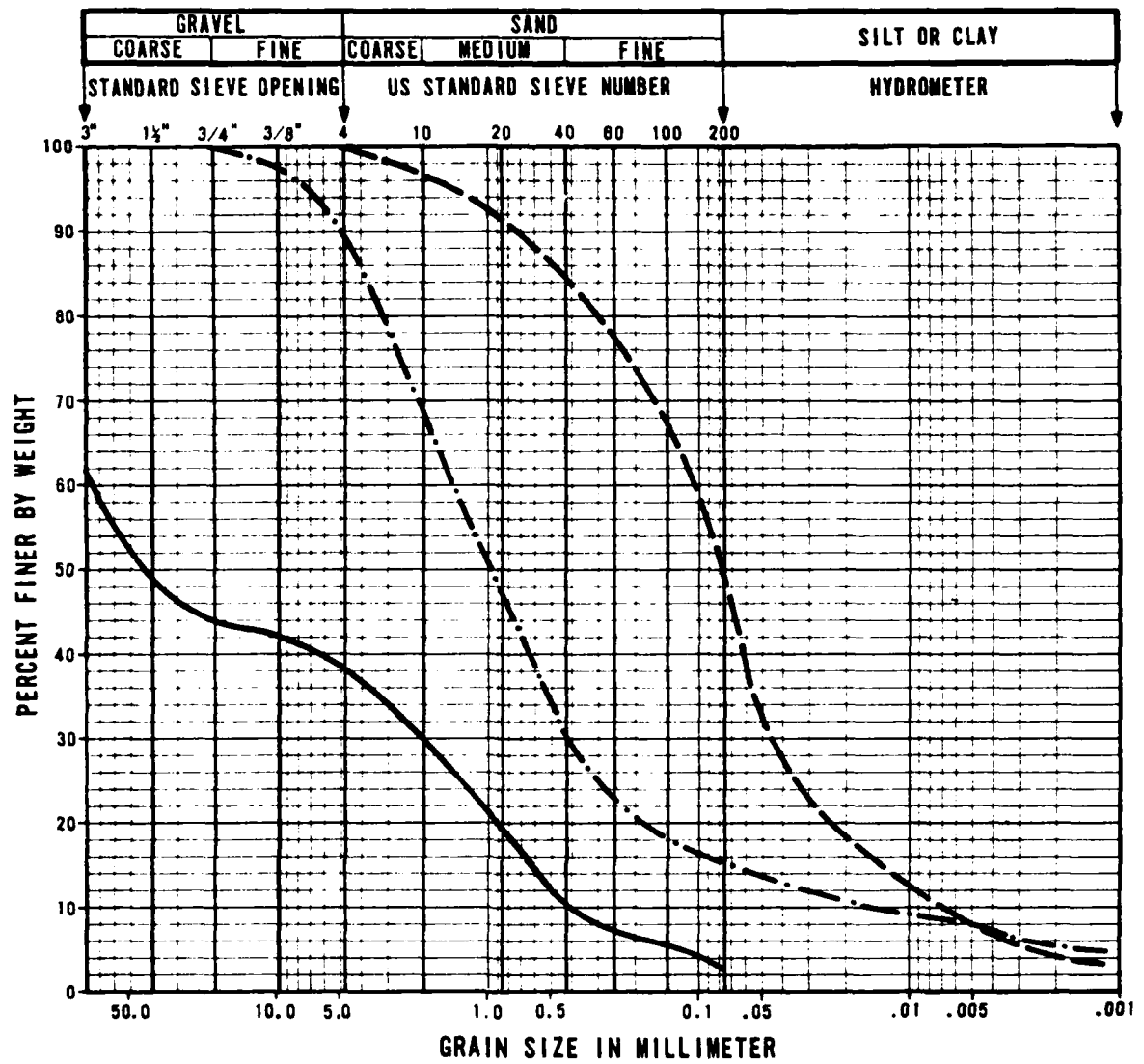


GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-246

UGRO NATIONAL, INC.



SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-14	B-1*	0.0-2.0	0.00-0.61				GP
- -	LD-T-14	B-2	9.0-12.0	2.74-3.66				SM
- · -	LD-T-14	B-3	19.0-21.0	5.79-6.40	44	21	23	SC

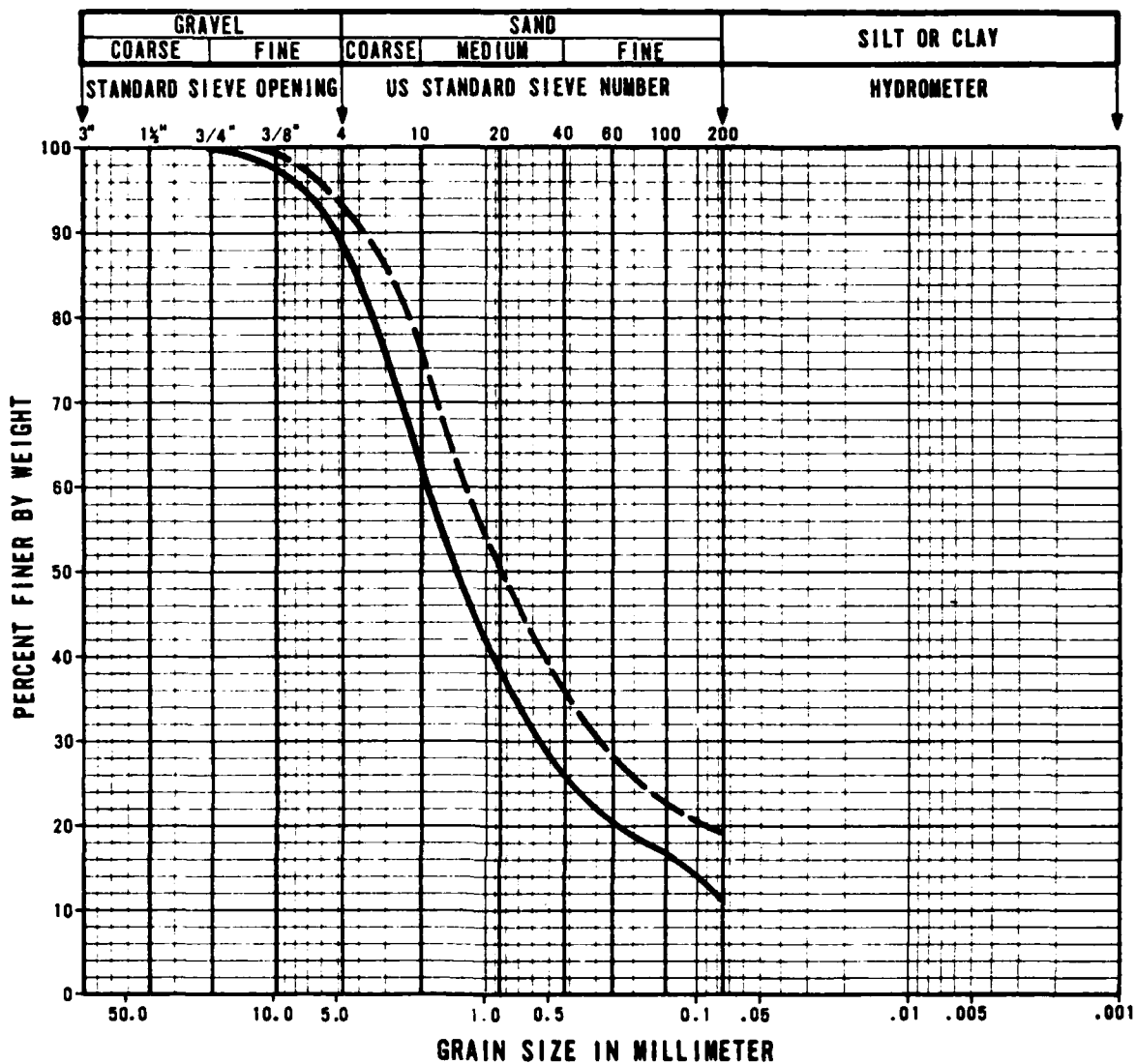
*All material passed a 12" sieve and 80% passed a 6" sieve

GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-247

FUGRO NATIONAL, INC.



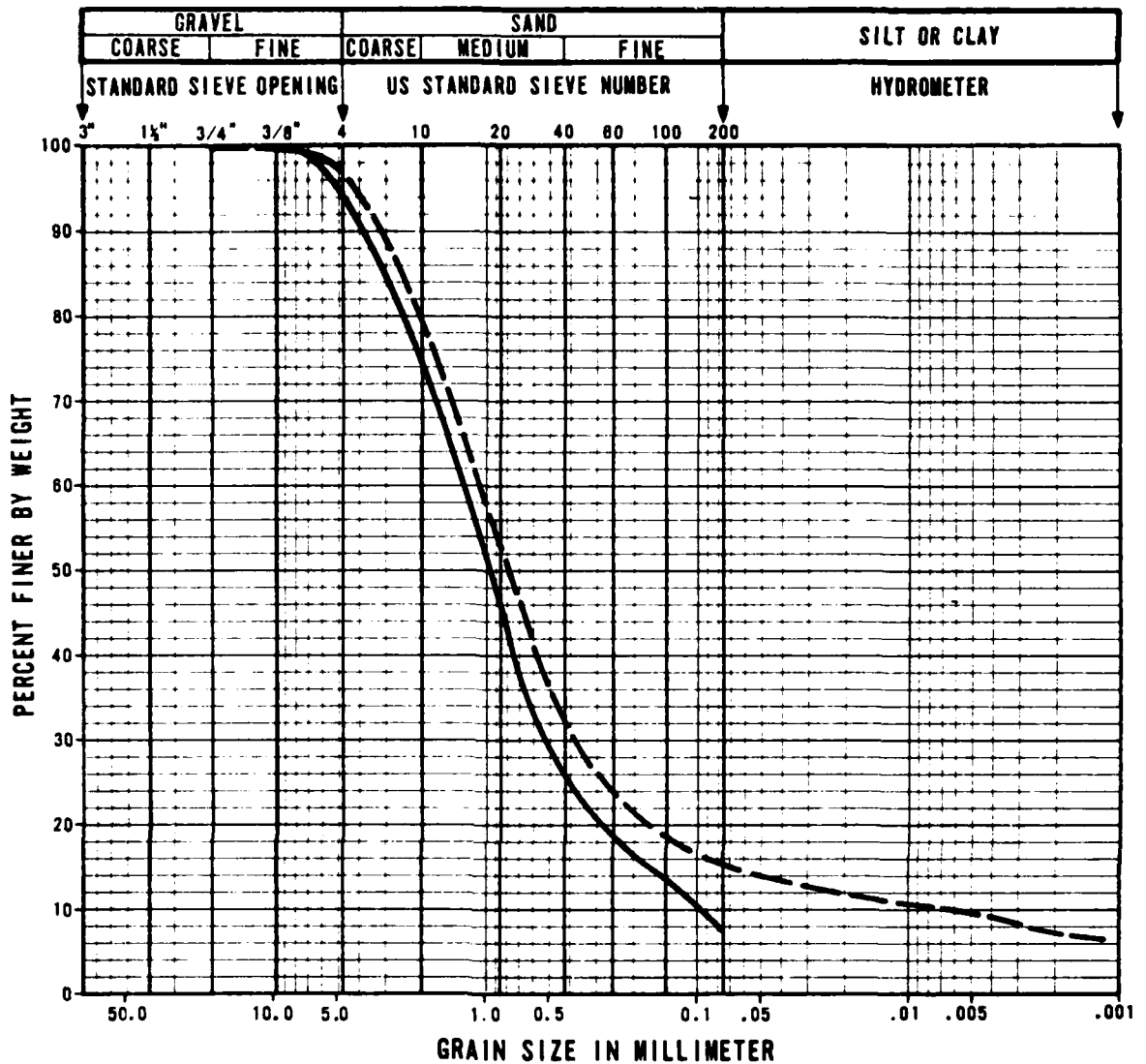
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-15	B-1	0.0-1.0	0.00-0.30		NP		SW/SM
- - -	LD-T-15	B-2	4.0-7.0	1.22-2.13	47	22	25	SC

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-248

FUGRO NATIONAL, INC.



SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-15	B-3	12.0-14.0	3.66-4.27				SW-SM
- -	LD-T-15	B-4	18.0-20.0	5.49-6.10	51	25	26	SC

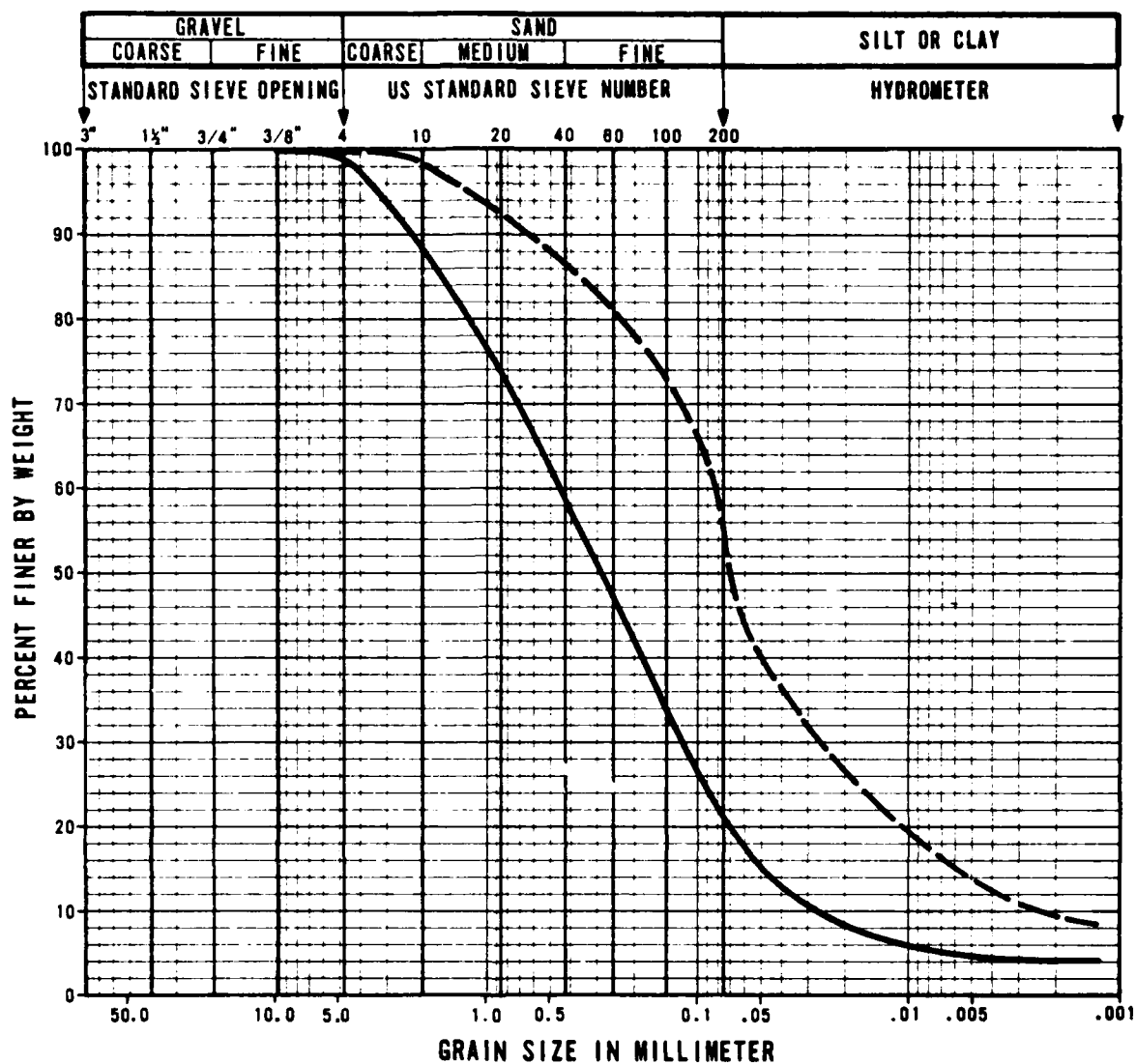
GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE

C-249

FUGRO NATIONAL, INC.



SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-16	B-1	0.0-1.0	0.00-0.30		NP		SM
- - -	LD-T-16	B-2	7.0-10.0	2.13-3.05		NP		ML

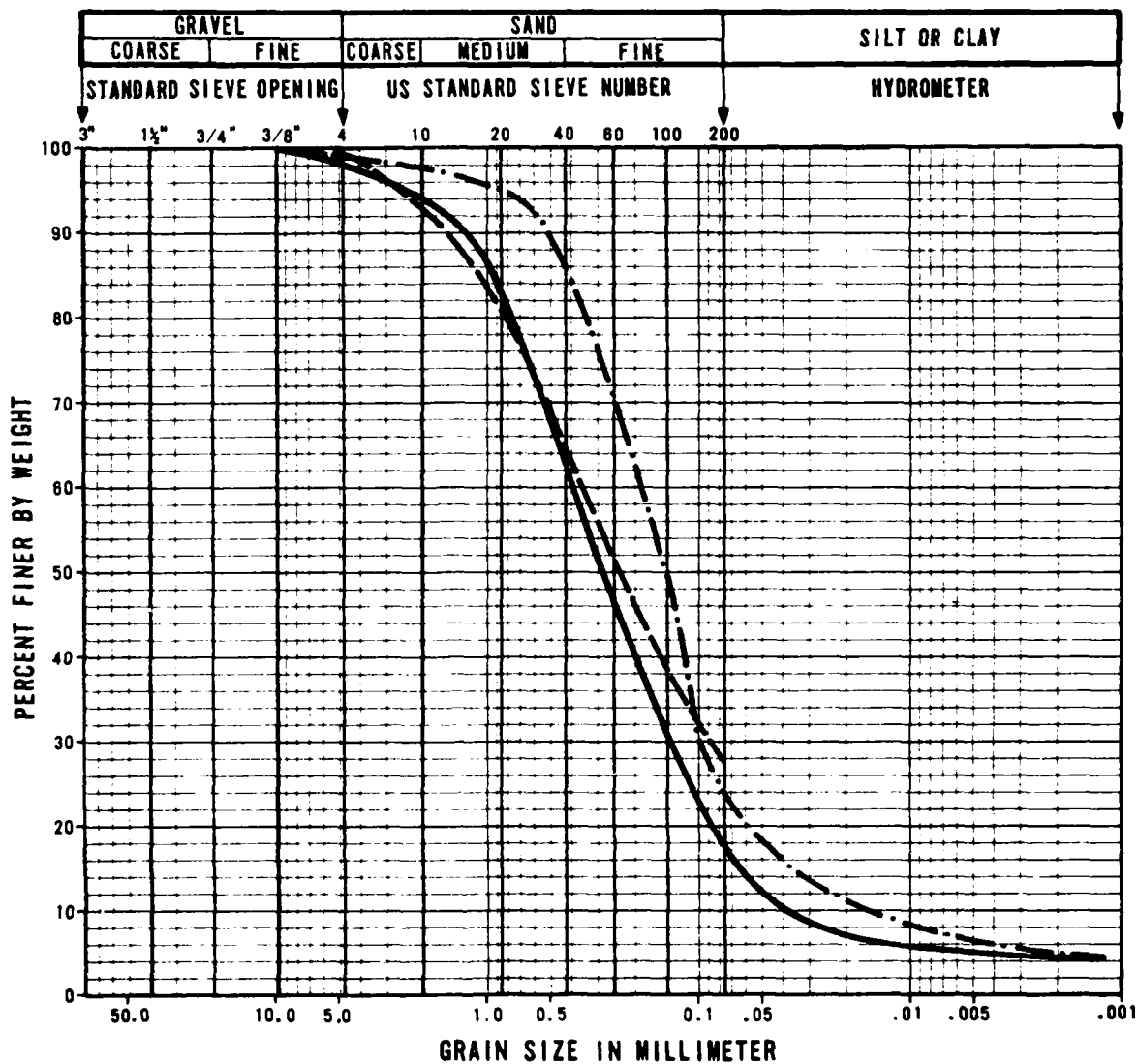
GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-250

FUGRO NATIONAL, INC.



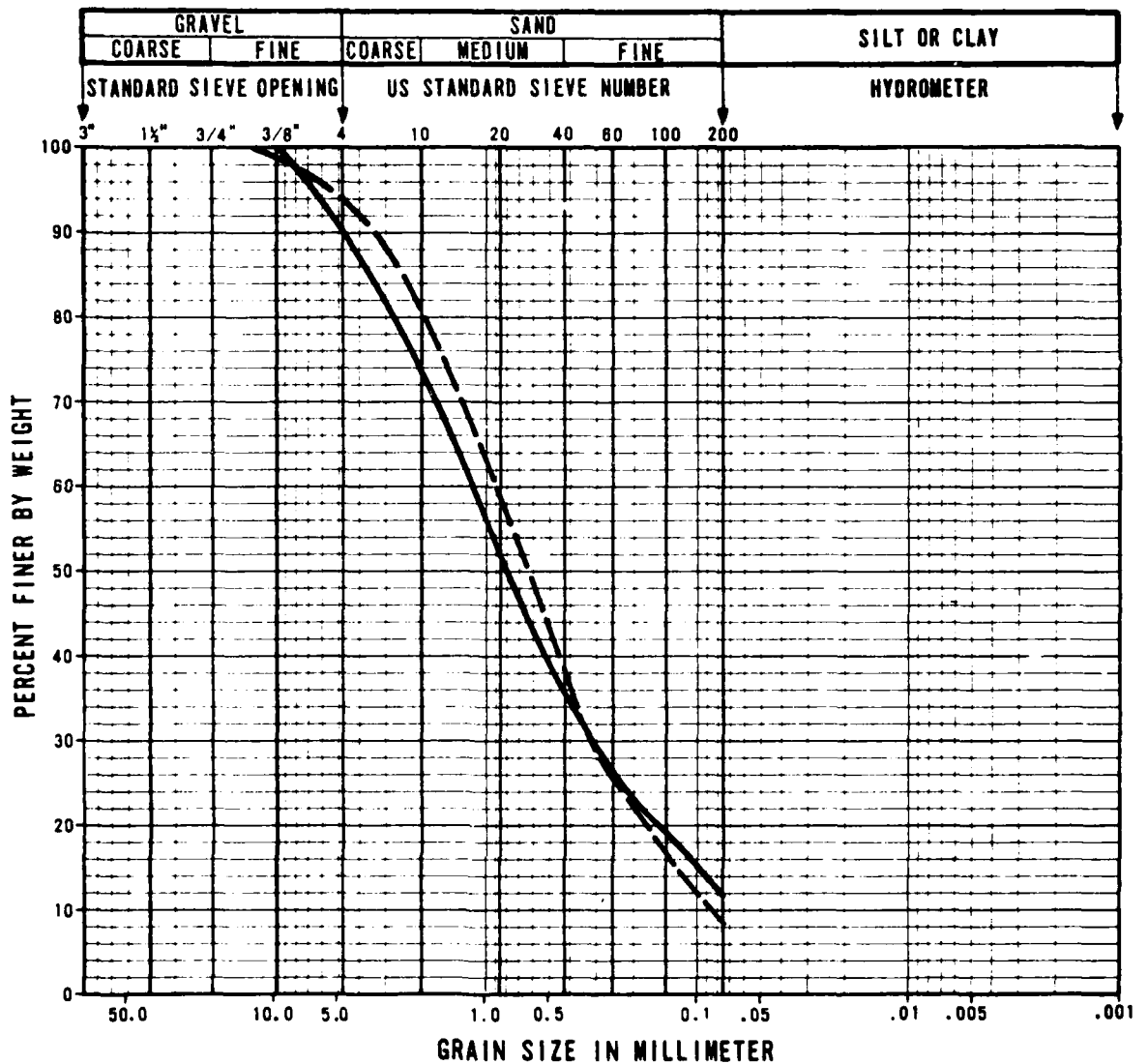
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-17	B-1	0.0-1.0	0.00-0.30		NP		SM
- - -	LD-T-17	B-2	8.0-11.0	2.44-3.35		NP		SM
- · -	LD-T-17	B-3	15.0-17.0	4.57-5.18		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-251

FUGRO NATIONAL, INC.



SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-18	B-1	0.0-1.0	0.00-0.30				SW/SM
- - -	LD-T-18	B-2	5.0-7.0	1.52-2.13				SW/SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE

C-252

FUGRO NATIONAL, INC.

AD-A113 450

FUGRO NATIONAL INC LONG BEACH CA

F/G 8/13

MX SITING INVESTIGATION. GEOTECHNICAL EVALUATION OF LUKE BOMBIN-ETC(U)

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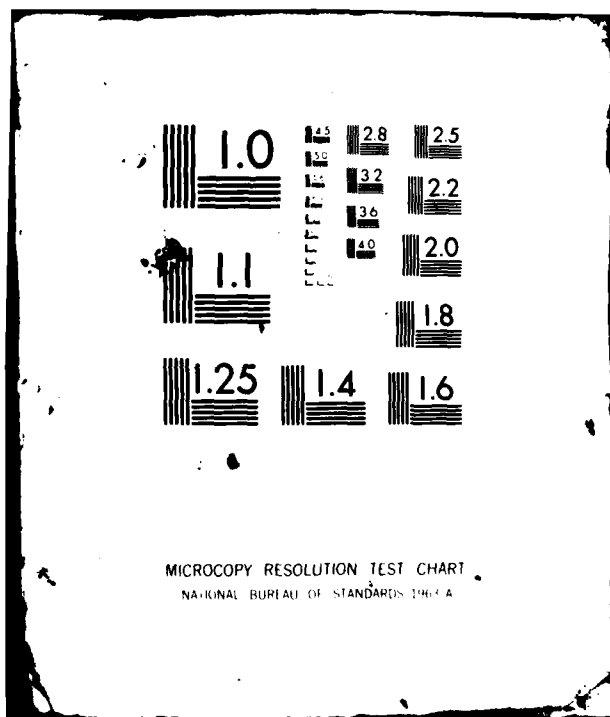
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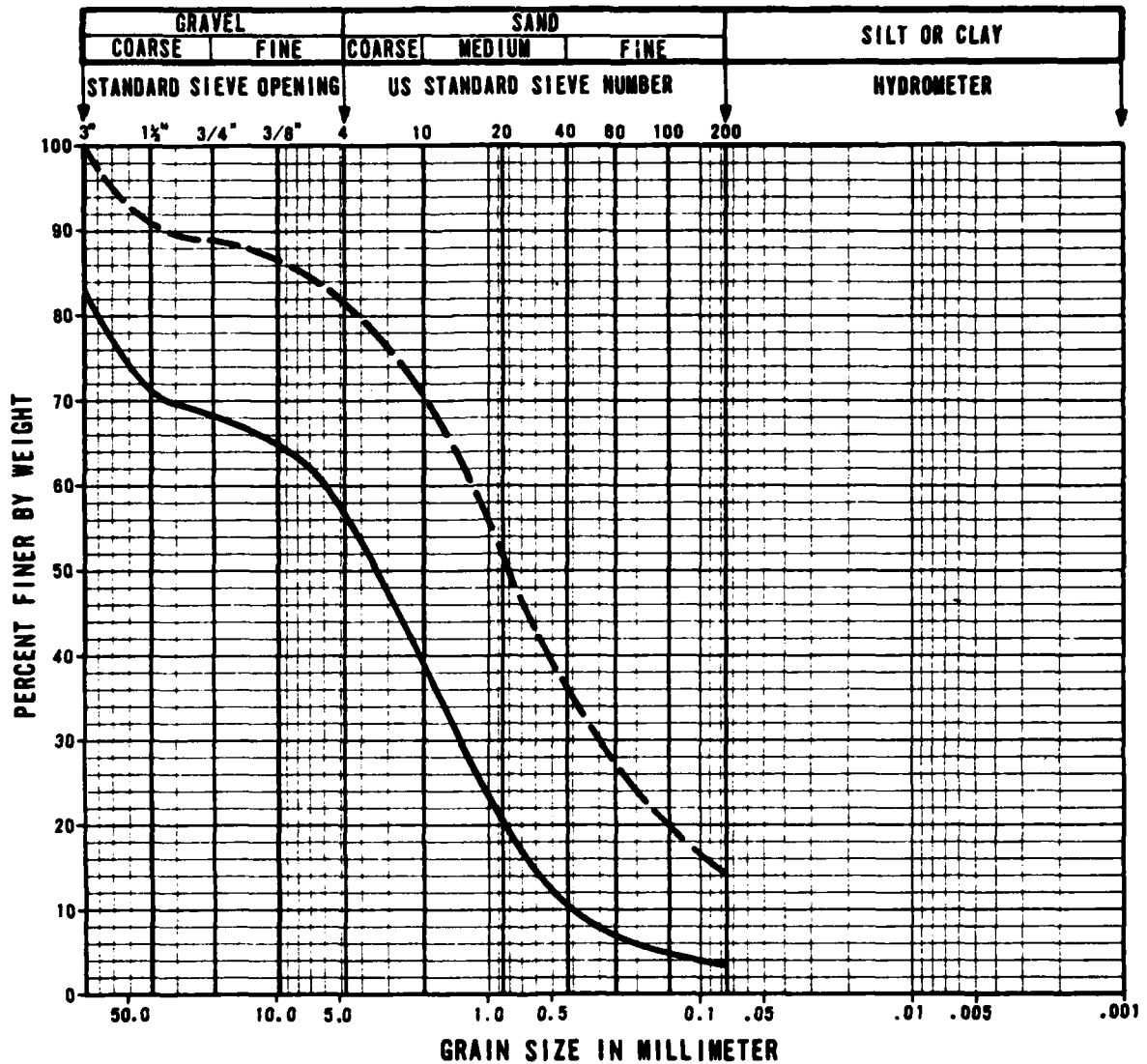
END

DATE

5-82

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SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-18	8-3*	8.0-10.0	2.44-3.05				SP
- -	LD-T-18	8-4	18.0-20.0	5.49-6.10		NP		SM

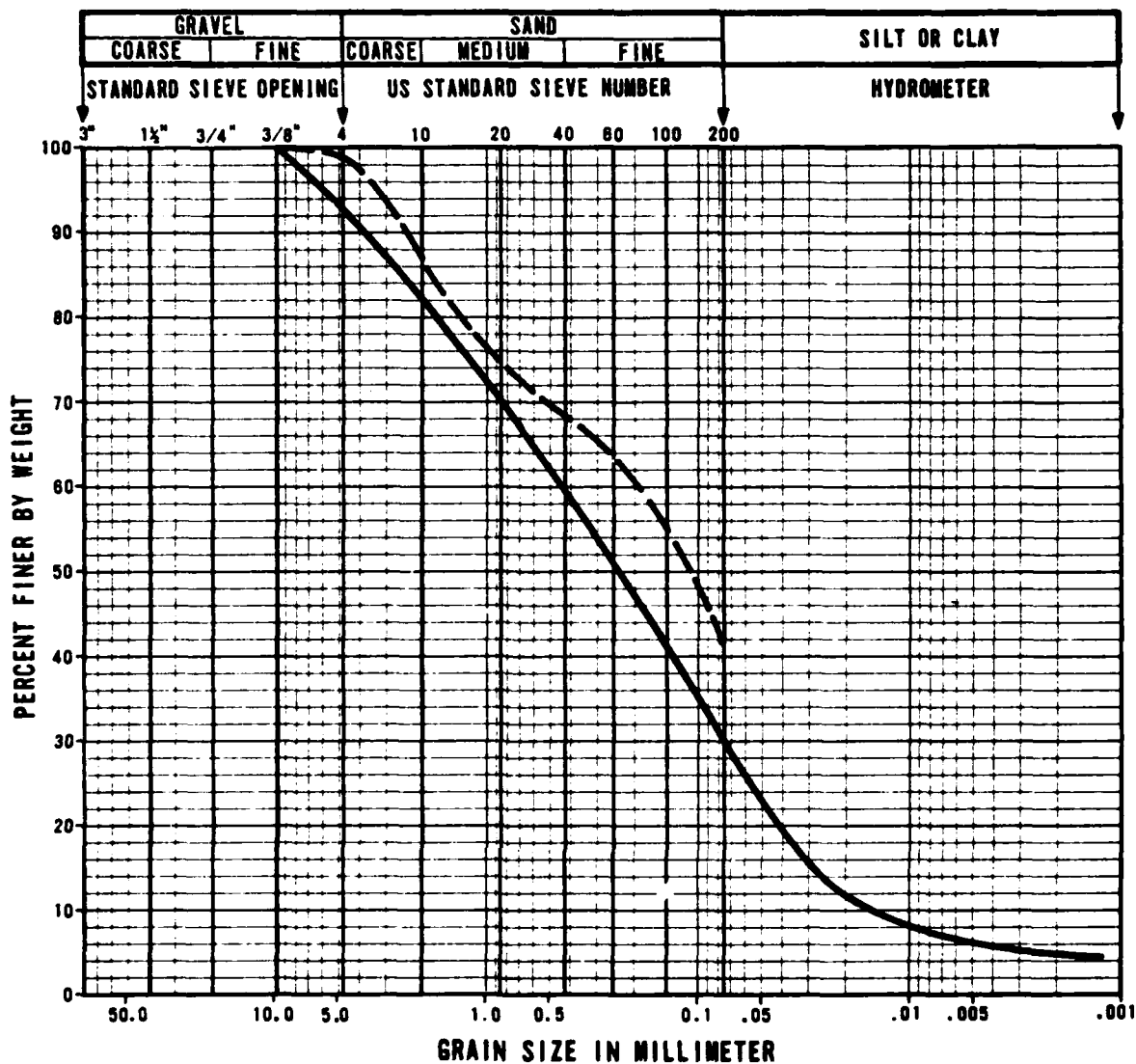
*All material passed a 6" sieve

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMSO

FIGURE
C-253

FUGRO NATIONAL, INC.



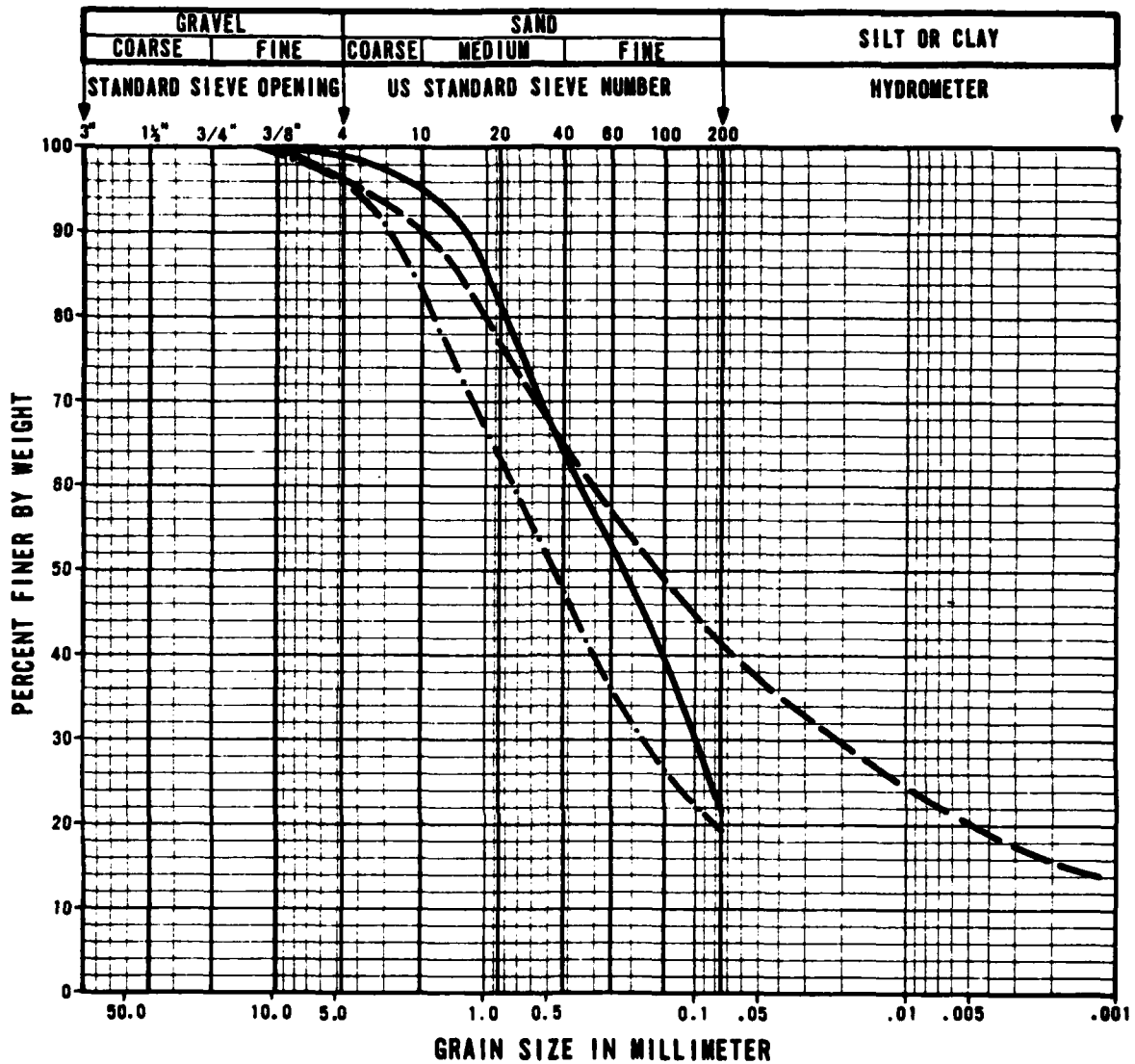
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-19	B-1	0.5-1.5	0.15-0.46		NP		SN
- - -	LD-T-19	B-2	3.0-6.0	0.91-1.83		NP		SN

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-254

FUGRO NATIONAL, INC.



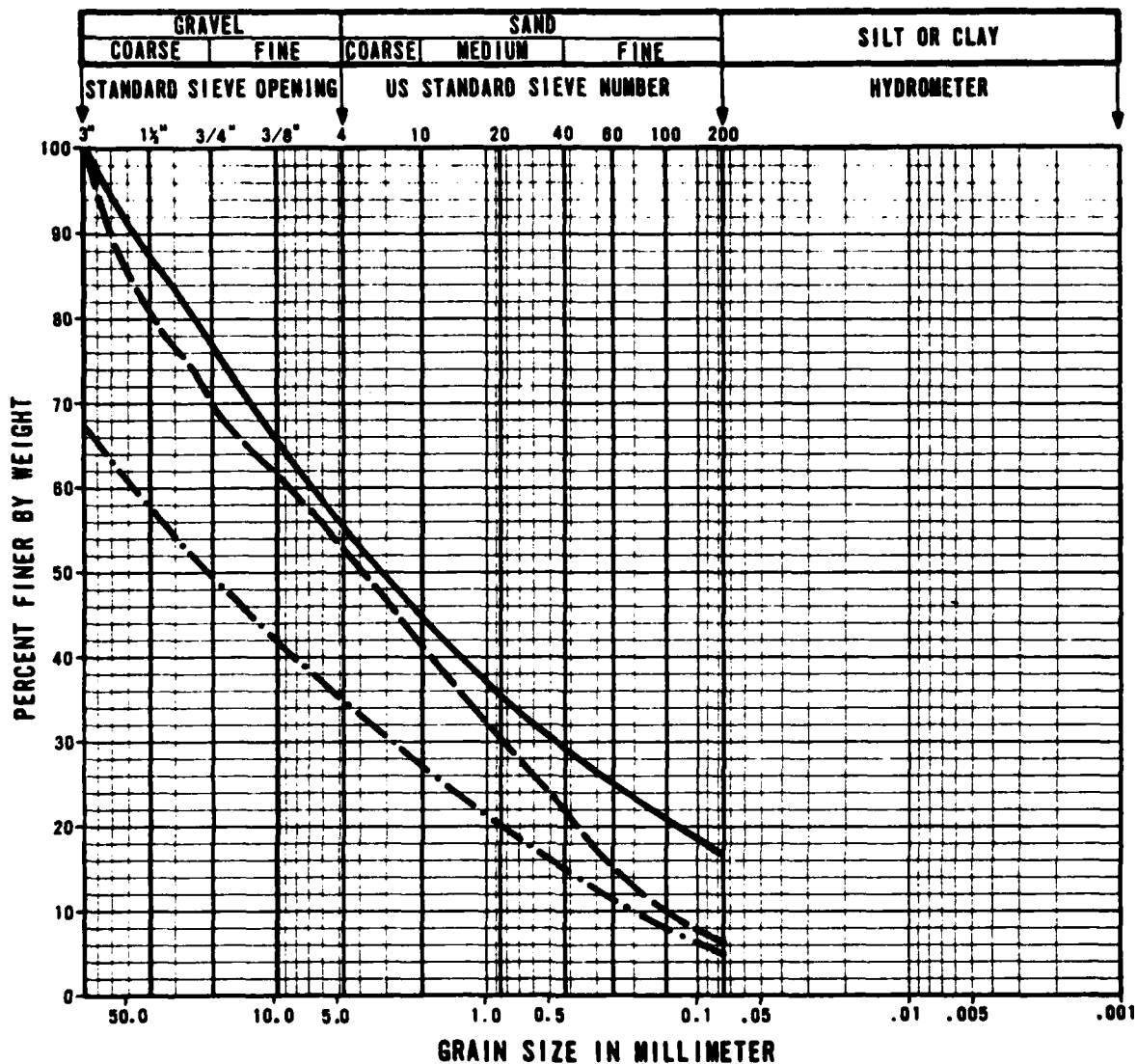
SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-20	B-1	0.0-0.5	0.00-0.15		NP		SM
- -	LD-T-20	B-2	3.0-6.0	0.91-1.83	50	21	29	SC
- · -	LD-T-20	B-3	18.0-21.0	5.49-6.40		NP		SM

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-255

FUGRO NATIONAL, INC.



SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-21	B-1	0.0-2.0	0.00-0.61		NP		GM
---	LD-T-21	B-2	4.0-6.0	1.22-1.83				GP/GM
-.-	LD-T-21	B-3*	10.0-12.0	3.05-3.66				GP

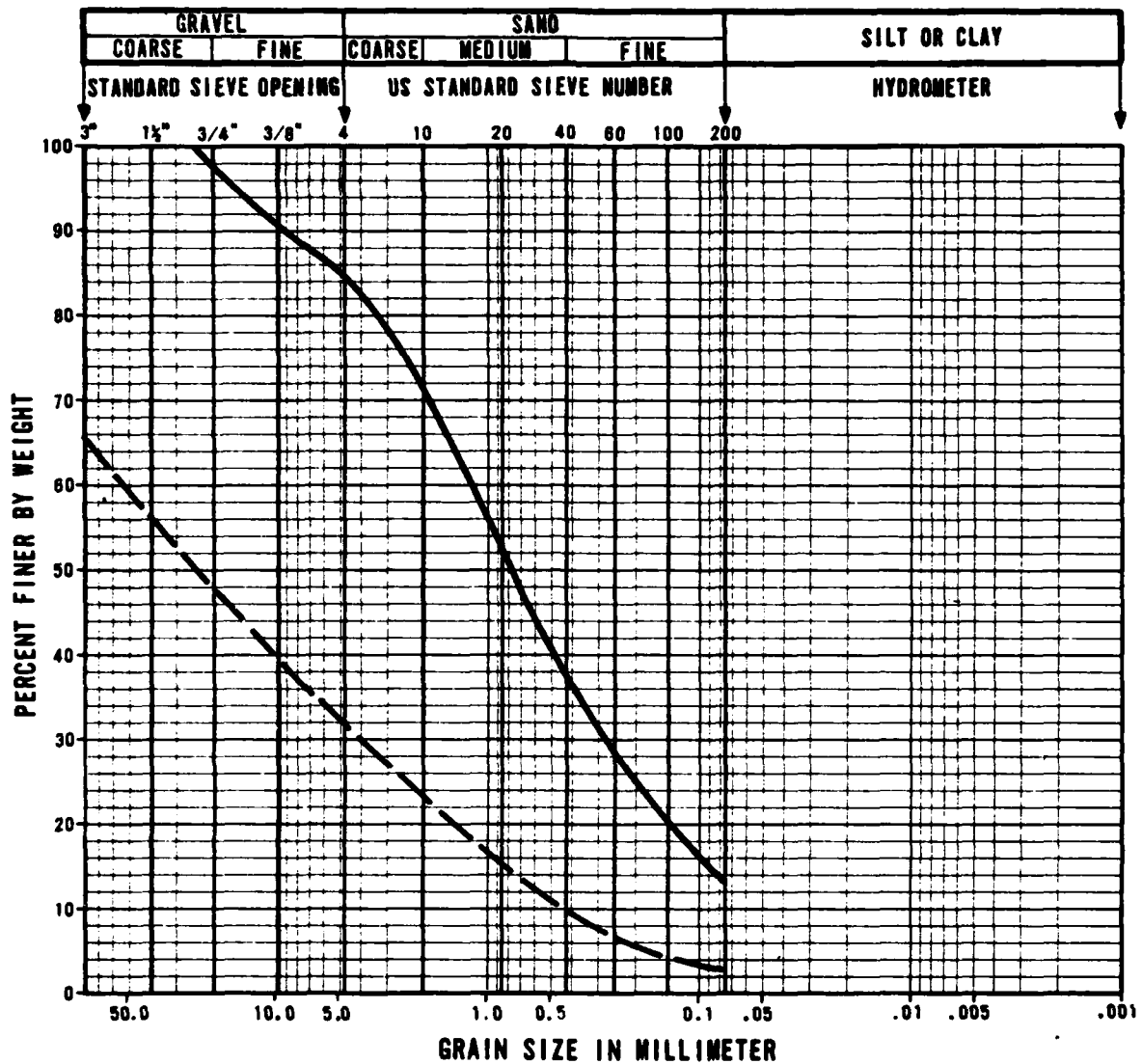
*All material passed a 12" sieve and 83% passed a 6" sieve

GRAIN SIZE CURVES
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
C-256

FUGRO NATIONAL, INC.



SYMBOL	TRENCH NO.	SAMPLE NO.	SAMPLE INTERVAL		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
			FEET	METERS				
—	LD-T-22	B-1	0.0-1.0	0.00-0.30		NP		SM
- -	LD-T-22	B-2*	13.0-15.0	3.98-4.57				GP

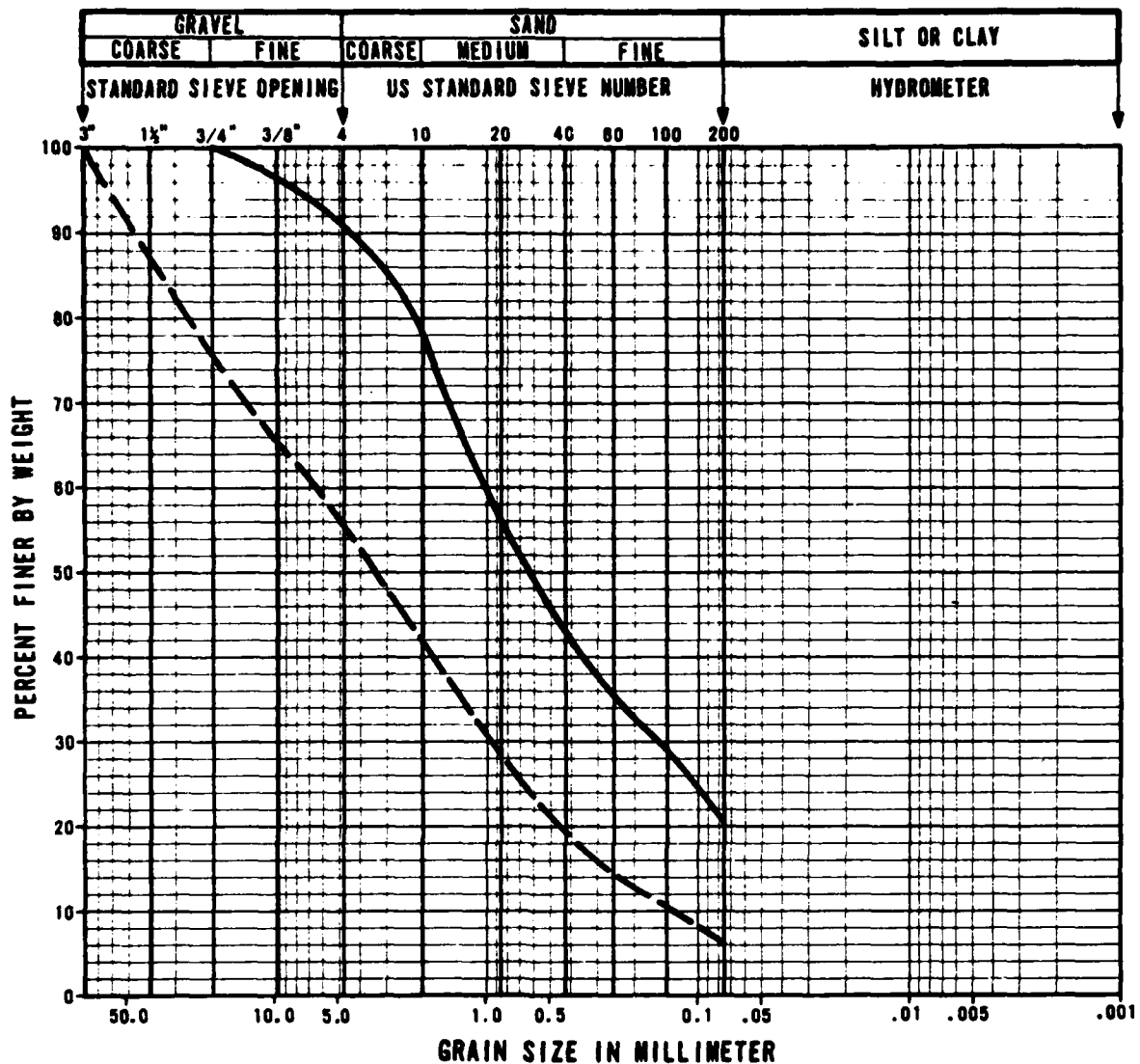
*All material passed a 12" sieve and 80% passed a 6" sieve

GRAIN SIZE CURVES LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
C-257

FUGRO NATIONAL, INC.



GENERAL SAFETY NOTICE

SAFETY NOTICE: PLEASE READ CAREFULLY

APPENDIX D SUPPLEMENT

D.3 GROUND GRAVITY SURVEY

D.3.1 EQUIPMENT

Gravity observations were made using a Lacoste-Romberg Model D gravimeter. This meter has thermostatic temperature control to minimize instrument drift, and electronic readout to simplify and increase the accuracy of readings.

The gravity response system of the meter consists of a weight on the end of a horizontal beam supported by a "zero-length" spring. A frictionless floating pivot for the beam is provided by shock eliminating springs. The manufacturer states that this arrangement provides a calibration factor that does not change perceptibly with time.

A gravimeter does not measure the total gravitational pull of the earth in absolute values. Instead, it measures relative differences in the gravitational pull from one point to another. The scale calibration factor or meter constant provides the proportionality between the meter units and gravitational acceleration. For this particular meter, changes in gravity on the order of one microgal (10^{-6} gals) are detectable.

D.3.2 FIELD PROCEDURES

A secondary base station was established in the survey area by running a 3-way loop referenced to a station in the International Gravity Standardization Net (IGSN, 1971). All gravity stations were included in a loop that began and ended with readings at the secondary base station.

Where possible, station location control was based on physically marked section corners on the ground. Where corners could not be found, the station locations were determined by use of a Del Norte Trisponder radar positioning system. This system measures the ranges between a Master station and two or more base stations, placed at known locations. The location of the master station is found by triangulation using the ranges measured from known locations of the base stations.

The stated accuracy of range determinations with this system is within 10 feet (3m) at ranges of 20 nautical miles (37.1 km).

Elevation control was obtained from U. S. Geological Survey topographic maps after the correct locations were plotted. Considering the good quality of the maps and the gentle relief over most of the area involved, it is estimated that elevations should be correct to within five feet (1.5 m) or better.

D.3.3 DATA REDUCTION

A secondary base station reading was made at the start and end of each day's work. The initial meter reading each day was considered to correspond to the established gravity value of the base station. All subsequent readings and adjustments are relative to this origin. The difference in the initial and final base station readings is the net drift for the day. Net drift is the combination of small deviations in the readings due to tidal effects and instrumental drift.

The first step in reducing the meter readings to gravity values was to correct for the tidal effects. The value of the tidal corrections is based on Goguel's (1954) formula:

$$C = P + N \cos \phi (\cos \phi + \sin \phi) + S \cos \phi (\cos \phi - \sin \phi)$$

P, N, and S are obtained from tables published annually by the European Association of Exploration Geophysicists. ϕ is the latitude of the observation point; P, N, and S vary with time. The tables give a value for P for each day and for N and S for each hour of solar (local) time.

To apply the corrections, the calculated values of tidal effects (in milligals) were normalized to an assigned zero value at the time of the initial base station reading. The normalized tidal effect values were converted to equivalent meter units, and each subsequent meter reading was adjusted to compensate for the calculated tidal effect. Residual differences remaining between the initial and final base station readings were a measure of instrumental drift. This remaining small drift was adjusted according to straight line interpolation relative to the time between initial and final occupation of the base station.

After making the drift adjustment of a meter reading at a given station, the remaining difference in readings between the base and the station was multiplied by the meter calibration constant to calculate the difference in gravity between the two locations. The difference was added algebraically to the base gravity value to determine the "observed gravity" of the new station.

A variety of corrections or reductions are made to the observed gravity to derive values that are useful for geologic interpretation. The observed gravity represents the total gravitational pull of the entire earth at the measurement station. The objective of the reductions is to isolate that portion of the gravitational pull that represents the crustal and near surface materials. The concept of the "Bouguer anomaly" is the basis for these reductions. In very simple terms, the Bouguer anomaly is the difference between the observed gravity and a theoretical value of gravity calculated for an assumed homogeneous earth on a surface called the geoid. This surface approximates the surface of mean sea level. Because the earth is believed to be homogeneous except for the upper mantle and crust, the Bouguer anomaly is taken to be indicative of the way the crustal materials differ from the assumed homogeneous model. Lightweight crustal materials produce negative Bouguer anomalies; heavy materials produce positive Bouguer anomalies.

The reductions made to the observed gravity are made to compensate for four geometrical effects:

1. Latitude effect
2. Free-air effect
3. Bouguer effect
4. Terrain effect

A fifth, the "Isostatic" effect (which considers the density distributions of large mountain ranges), was ignored because it is negligible in this location.

The theoretical value at the geoid beneath a station was subtracted from the observed gravity. The Gravity Formula for the Geodetic Reference System, 1967 (GFGRS, 1967) was used to calculate the theoretical gravity. The Formula for g in gals or centimeters per second squared is:

$$g = 978.0318 (1 + 0.0053024 \sin^2 \phi - 0.0000058 \sin^2 2\phi) \text{ gals,}$$

where ϕ is the latitude in degrees

This step accounts for the latitude effect, which considers both the spheroidal shape of the earth (the positive term) and the centrifugal acceleration (the negative term).

The free-air correction to the observed gravity accounts for the geometric (Newtonian) effect of the station's being farther from the center of mass of the earth than the geoid. This correction considers no effect of local density and is positive in sign. The free-air correction was also used to calculate the free-air anomaly, which was used to study the relationship between observed gravity and elevation of the terrain. The free-air anomaly is the observed gravity minus the free-air gravity. The free-air gravity is the theoretical gravity minus the free-air correction.

The Bouguer correction considers the contributions to the observed gravity of a slab (or stack of slabs) of "normal" density beneath the point of observation. Normal practice, which is to correct for a slab with a density of 2.67 g/cc was followed in this study.

When the latitude, free-air and Bouguer corrections have been made, the remaining gravity value is called the simple

Bouguer Anomaly. Most of this gravity represents the effect of material beneath the station, but part of it may be due to imperfections (terrain) in the top of the (upper) Bouguer slab in locations away from the station. For this study, "terrain corrections" were made where the terrain effects were on the order of 0.1 milligals or greater. The Hammer Terrain Correction Chart (1) was used to calculate the terrain correction. Terrain corrected Bouguer values are referred to as complete Bouguer anomalies. This completes the data reduction at the individual stations.

Complete bouguer values were posted on the base map and contoured to represent the gravity "field". The Bouguer anomaly map shows the combined effect of very near surface and deeper material fluctuations. The objective of further field processing is to interpretatively define the portion of the Bouguer anomaly that can be ascribed to the presence of lightweight basin fill/sedimentary bedrock material over the heavier crystalline basement rocks forming the outcrops and presumably the basin floor.

INTERPRETIVE REDUCTION OF THE GRAVITY FIELD

One much used technique for achieving an interpretation is to deduce a "regional trend" of Bouguer gravity, to subtract this from the Bouguer Anomaly field, thus producing a "residual" anomaly map, and then to compute the thickness of alluvium (depth to basement) on the basis of the principle that the residual anomaly represents a gravity field whose source is the density contrast between alluvium and the higher density (2.67 grams per

cubic centimeter) used for the Bouguer reduction. The tacit assumption of the above procedure is that the "regional" field (which is deduced from the observed data) is the portion of the field produced by basement rocks. Since the interpretive selection of the regional field is such a key step in the final interpretation of the gravity data, this step was guided by more than one procedure. The basic approach was to fit a second order polynomial surface to the Bouguer values of the bedrock stations.

The results of this approach were evaluated by comparison to the result of upward and downward continuation of the field, another technique which can be used for regional/residual determination.

Continuation of the gravity field

In Potential Theory, a field normal to a surface, regardless of its actual source, may be considered as originating in an areal distribution of mass on that surface, and if the field strength is known the surface density of mass (grams per square centimeter) can be calculated. The observed gravity field at the surface of the earth approximately fulfills the requirements of this theory: thus the observed (Bouguer anomaly) field can be used to compute a surficial distribution of mass which would reproduce the field, and most importantly, account for the gravity field anywhere above the surface of observation. On this basis, the Bouguer anomaly field is readily "continued" to level surfaces above the ground.

An important property of such "upward continuation" is that the

resultant field (which can be represented by a contour map), with increasing altitudes of continuation, changes more with respect to shallow sources than it does with respect to deeper sources. The anomalous parts of the field ascribed to shallow density distributions tend to vanish as the continuation is carried upward whereas the field produced by deeper sources changes only slightly, so that upward continuations produce "regional"-type fields. Residual separations then can be made for the purpose of "pin-pointing" shallow sources. The most important objective of a sequence of upward continuations is the role they play in expediting "downward continuation."

Downward continuation of the gravity field

Unlike the case of upward continuation, downward continuation is not a closed analytic process. In terms of the calculus the process requires the finding of the integrand in a double (surface) integral when the value of the integral is known ("Solution of Integral Equations"). A typical attack on this type of problem is through the invocation of Fourier Transforms (into "frequency space") and their attendant problems. A more easily implemented solution is provided by the use of a Taylor's Series at each gravity observation point. The coefficients of the series, applicable at the observation point, are evaluated by fitting the series to a sequence of upward continuation levels (including the ground surface value). The upward and downward processes are especially amenable to computer-processing if the randomly distributed station values are first projected onto the "nodes" of a rectangular grid system (the nodes being

corners of squares, and the grid-spacing being commensurate with the station spacing). The nodal values are then entered into computer processes, with the output returning as nodal values which may then be displayed in map form either as plotted numerical values or as contour lines. Conveniently the variable used in the Taylor' Series is altitude (with reference to sea level; algebraic sign negative for levels below sea level).

A significant property of downward continuation is that anomalous parts of the field are "sharpened" as their gravimetric sources are approached in a sequence of levels. In theory the process becomes invalid at the level at which a source is encountered. (The process is fundamentally based on La Place's Equation in Free-Space; it is still applicable in the presence of "uniform fields" such as are produced by homogeneous slabs which may be encountered; it fails upon encountering non-uniform sources, where the more-difficult-to-evaluate-Poissons's Equation, involving local density, is appropriate). Practically, downward continuation into a source is very apparent in the mapped field (whether a nodal plot of gravity values or a contour map). The indicators are the appearance of excessive gradients (unusually 'tight' contours) and oscillatory nodal values (where adjacent nodes have alternating algebraic sign and excessively large absolute values). Thus, a sequence of downward continuations establishes a maximum depth of an anomalous source. The maximum depth will not generally occur at the same level in all parts of an area under study,

but after the field deteriorates in a particular part of the area there will be no further information on source depths at a lower level in that part of the area; thus in the downward continuation process the occurrence of a shallower source may mask a deeper source which may have been followed readily in other parts of a survey.

Estimation of relief, from the downward continued field.

If the field is continued to a level just above an anomalous source, and a suitable density contrast can be assigned for the material above and below this interface, then the relative relief of the interface can be estimated by use of the usual Bouguer slab formula, solving it for change in thickness as a function of change in field. After the relative relief is found, this can be arbitrarily adjusted to approximate elevations of the interface known from other sources, preferably by the addition of a constant to all of the relief.

Second Vertical Derivative of the Bouguer Anomaly.

Once the Bouguer Anomaly field has been projected onto a uniform grid system, the second vertical derivative (SVD) of the field at nodes of the grid is readily computed. In accordance with Laplace's Equation in Free Space, the negative of the second vertical derivative is equal to the sums of the second derivatives in the x-direction and in the y-direction (ie., along the grid line directions). The second vertical derivative is an indication of the curvature of the Bouguer anomaly field. In particular,

the zero-value of the SVD indicates the inflection in the field as it changes from "concave-upward" (algebraically negative SVD) to "convex-upward" (algebraically positive SVD). In a general way, the zero SVD falls on the tightest contours of the field, and thus where contours are nearly parallel its location can be established by eye. However, where contours diverge, converge, or change direction this is not always so readily done; here the computer process is indispensable.

A general method for interpreting a Bouguer anomaly field is to set up source models, compute their fields, compare these with the actual field, change the model and its parameters (size, shape, density contrast, etc.). One naturally looks for indices or characteristics of the fields which will expedite the change of models and their parameters. One use of the SVD is in the capacity of such an index; the SVD of the model is compared with the SVD of the Bouguer anomaly. The study of numerous simple models indicates that the zero SVD tends to follow abrupt changes in mass distribution; thus, the zero SVD contour line may be an indicator of a line of faulting, the pinchout of a stratum, truncation of a stratum at an unconformity or merely a marked change in shape or in density of a geologic unit.

Nature of geologic interpretations based on potential field data.

When the reader is evaluating the basin shape, he should keep in mind that it is unlikely that an accurate dip of a steeply dipping fault plane would be derived from a gravity interpretation, especially when the observations are a mile (1.6 km) apart. The

nature of potential field observations is such that the effects of many features are integrated into the observation; isolating an estimation of the effect of a particular feature will generally be approximate. If a residual field is used as the basis for geologic modeling, it will have been influenced by the interpreter's choice of a regional field. The calculation of the Bouguer Anomaly, the precision of the field observations, the density contrast(s) used in the modeling process, and the type of modeling used, will also affect the appearance of the geologic structure shown. The normal expectation is that where very steep geologic features occur, the dip (if the depth is reasonably correct) calculated by modeling gravity observations over the features will be less than the actual dip.

D.6 DOWNHOLE SEISMIC VELOCITY SURVEYS

D.6.1 EQUIPMENT

Downhole seismic velocity recordings were made using an SIE Model RS-44 amplifier system and Model R6A oscillographic recorder. The system is capable of recording up to 24 channels of data on 6 inch (15.2 m) wide photo-sensitive, direct write recording paper. Full width timing lines are impressed on the record at ten millisecond intervals.

Mark Products Model L-10-3D-SWC downhole geophone assembly was used to detect the seismic wave arrivals in the boring. The assembly contains three mutually perpendicular geophones with natural frequency of 4.5 Hz. It is equipped with a leaf spring which maintains contact with the boring (casing) wall.

The record format included six signal traces and a "time break" trace. The amplified output of each of the three geophones was displayed at two different gain settings. The time break trace recorded the instant an electrical circuit was completed as the energy was generated. The "switch" in the circuit was formed by contact between a sledge hammer and a metallic surface which was being struck.

D.6.2 FIELD PROCEDURES

Downhole seismic travel times were obtained by mechanically generating energy at the surface and recording the arrival of the energy at a number of depths in a nearby boring. The horizontal separation between the boring and the point of energy

generation was approximately 20 feet (6 m). The boring was cased with three inch (7.6 cm) diameter PVC pipe. Cuttings and surficial materials were shoveled into the annulus between the boring wall and the PVC in order to provide mechanical coupling. The pipe was vibrated from side to side while filling the annulus to minimize bridging of materials part way down.

To begin the downhole observations, the geophone assembly was placed at a depth of ten feet (3 m). Then three seismograms (records) were obtained. Energy for the first record was generated by a sledge hammer blow downward on a metal plate lying flat on the ground. This act generated a relatively strong compressional wave.

Energy for the second record was generated by a horizontal sledge hammer blow on the metal end plate at one end of a wooden beam lying flat on the ground. The beam was oriented perpendicular to a line extending from its center to the boring. It was coupled to the ground by having the wheels of a vehicle parked on it. A horizontal blow of this type produces shear wave energy, and relatively small compressional wave energy.

Energy for the third recording was generated by striking a horizontal blow against the metal end plate at the other end of the wooden beam in order to produce shear waves with oscillatory polarity opposite to that generated for the second record.

After these three records were obtained, the geophone assembly was lowered ten feet (3 m) into the hole and three more records were obtained in the above pattern. This procedure was repeated until the bottom of the boring (maximum of 490 feet, 149 m) was reached.

D.6.3 DATA REDUCTION

The records were analyzed to determine the travel time between the impact and the arrival of the seismic waves at the geophone assembly. The compressional waves usually appear as a rather obvious excursion of the traces from their rest position. Except when the geophones are at shallow depths, this arrival is normally observed most readily on the trace(s) representing the vertical geophone. The records obtained from the vertical hammer blows are the primary source of compressional wave travel time data.

The arrival of the shear wave usually occurs while the traces are still oscillating in the "wake" of the earlier arriving compressional wave. The shear wave typically causes an increase in amplitude on the trace and a lengthening of the recorded period, but the instant it arrives may be partially obscured by the compressional wave "noise". Since the shear wave is a polarized wave, the traces from the horizontal geophones on two records made with oppositely polarized energy (blows on opposite ends of the beam) are compared to note the point of phase reversal in order to identify the shear wave arrival.

The wave travel times are reduced according to the ratio of the depth of the geophone in the boring and slant distance between

the impact point and geophone. These reduced times are plotted on a graph of travel time versus depth. The velocity profile is interpreted by fitting straight line segments through the points. The velocity in a particular zone is indicated by the inverse slope of the line segment through that zone (slope defined as $\Delta \text{ time} / \Delta \text{ depth}$).

The seismic wave velocities and laboratory values for density of the materials are used to calculate values for Poisson's Ratio and dynamic elastic moduli using Fugro's computer program PMOD2. The equations used are:

POISSON'S RATIO, μ , (a dimensionless number)

$$\mu = \frac{V_p^2 - 2V_s^2}{2(V_p^2 - V_s^2)}$$

SHEAR MODULUS, G , (in KN/m^2)

$$G = CDV_s^2$$

YOUNG'S MODULUS, E , (in KN/m^2)

$$E = 2(1 + \mu)$$

BULK MODULUS, K , (in KN/m^2)

$$K = CD(V_p^2 - 4/3 V_s^2)$$

Where: V_p = compressional wave velocity (meters per second)

V_s = shear wave velocity (meters per second)

D = density (kilograms per cubic meter)

C = 1.0×10^{-3} (constant of units conversion)

In cases where shear waves could not be identified by direct examination of the seismograms, the shear wave velocity was computed from the compressional wave velocity and the respective unit weight of the material for interval being examined. The method used is one published by the Birdwell Division of Seismograph Service Corporation. This method uses an empirical formula developed from extensive tests on a variety of materials. The formula used for calculation of the shear wave velocity is:

$$V_s = V_p \left[1 - 1.15 \frac{1}{D} + \frac{1}{D^3} \right]^{3/2}$$

$$e^{1/D}$$

where: V_s = shear wave velocity (units the same as V_p)
 V_p = compressional wave velocity in feet per second or meters per second

D = bulk density in grams per cubic centimeter

Calculations of dynamic moduli and Poisson's ratio which utilize shear wave velocities computed by use of this formula are noted in the text. Such computed values should be considered only as rough approximations.

**DAT
FILM**